

SEPTEMBER 10, 1960

# Chemical Week

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Survey pegs outlook  
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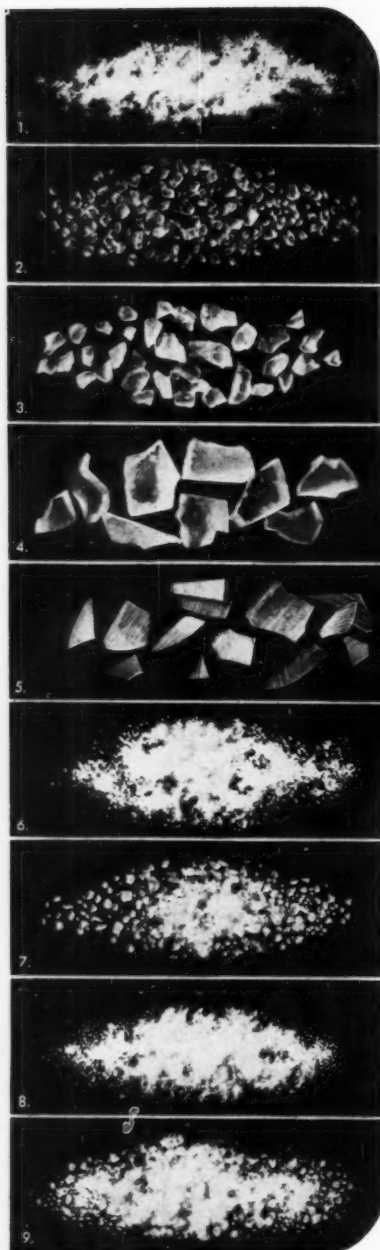
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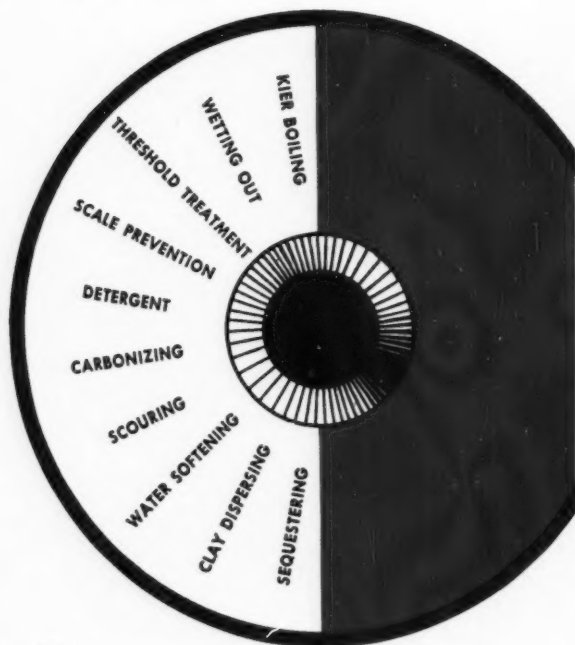
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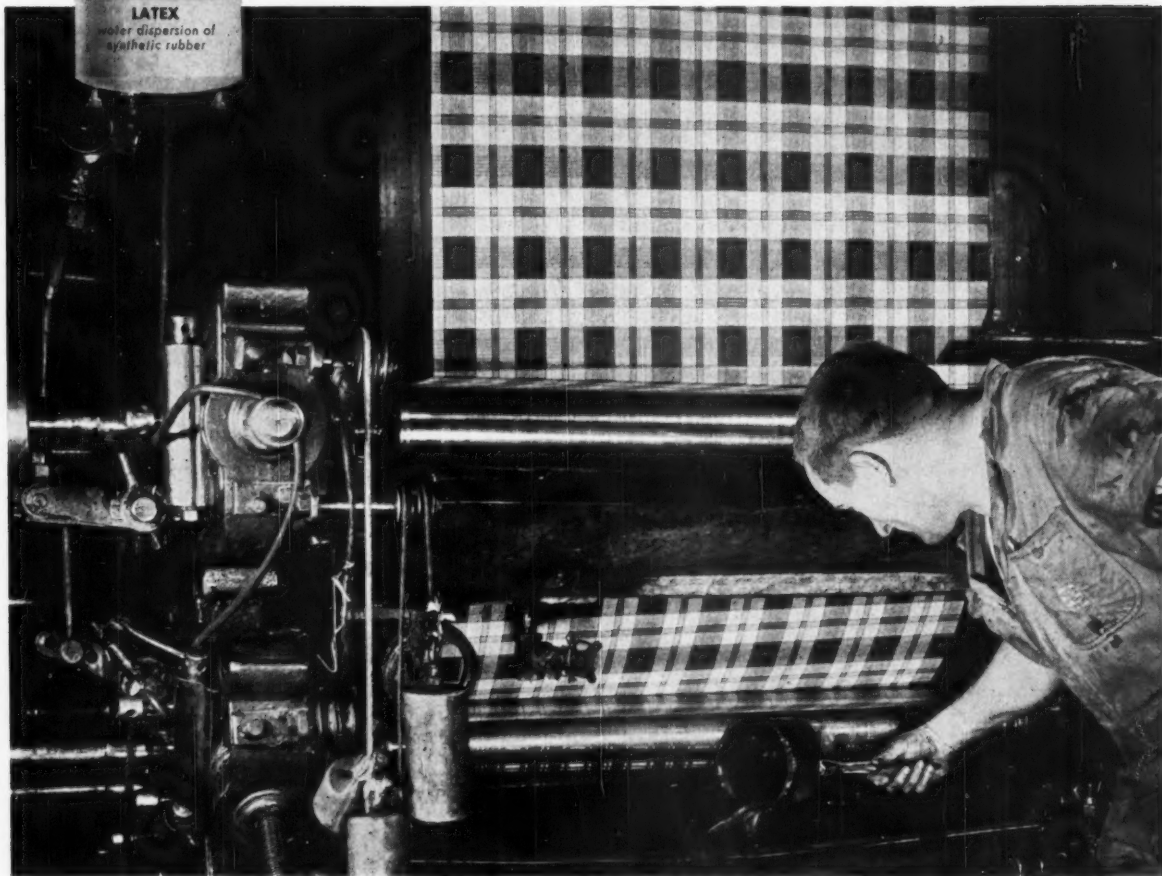
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September 10, 1960 CHEMICAL WEEK 1

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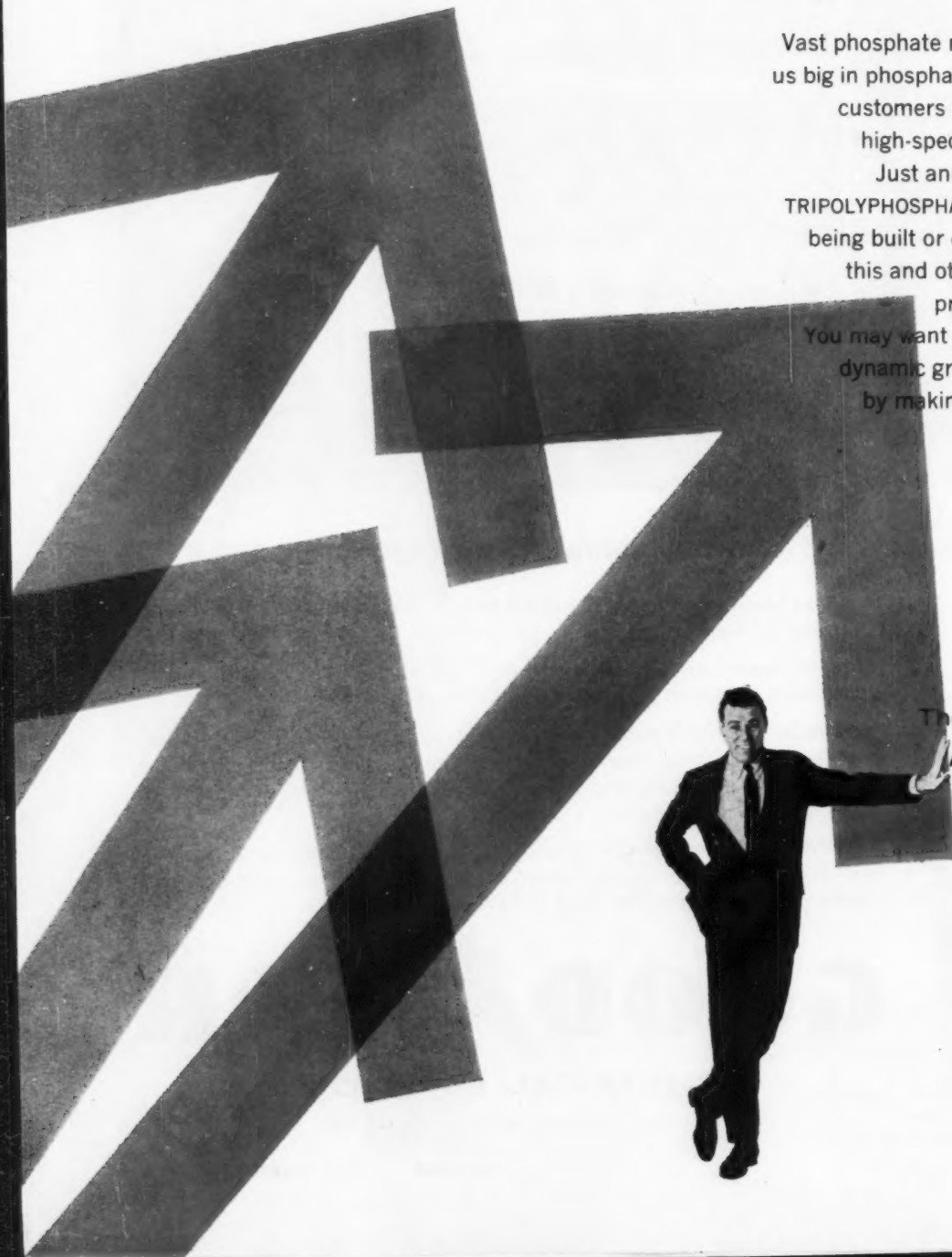


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**ON THE COVER:** The steel furnaces shown in this picture by Eastfoto are part of the Anshan Steel Centre, in Manchuria. Anshan, China's largest steel producer, was originally built by Japan; it has been modernized, enlarged with Soviet aid.



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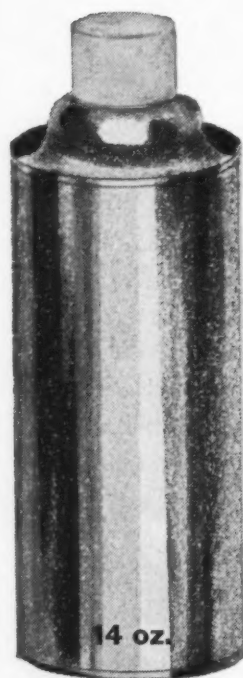


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## Cutting Prices Is Not the Answer

THINGS GOING A BIT ROUGH? Able to make more than you can sell? The answer is simple: Cut the price. That, at least, appears to be many chemical firms' solution of an increasingly worrisome problem—judging by the rash of price-slashing that's so in evidence this summer.

The whole situation is reminiscent of the clothing manufacturer who "lost a little" on each suit he sold. The only way he managed to stay in business was "on the volume" he did.

The plain truth is that the costs of raw materials, equipment, capital and labor have been steadily rising. Chemical prices should be rising too. Not only aren't they going up, they're actually going down.

The explanation to the paradox is rather simple. Some of the price cutting is a natural, competitive reaction to a marketing picture where many lines are over-built—at least temporarily. Some is no doubt due to need to meet the influx of cheap, foreign material. But a great deal, we suspect, has been triggered by a desire to keep nonchemical companies out of the business of manufacturing chemicals.

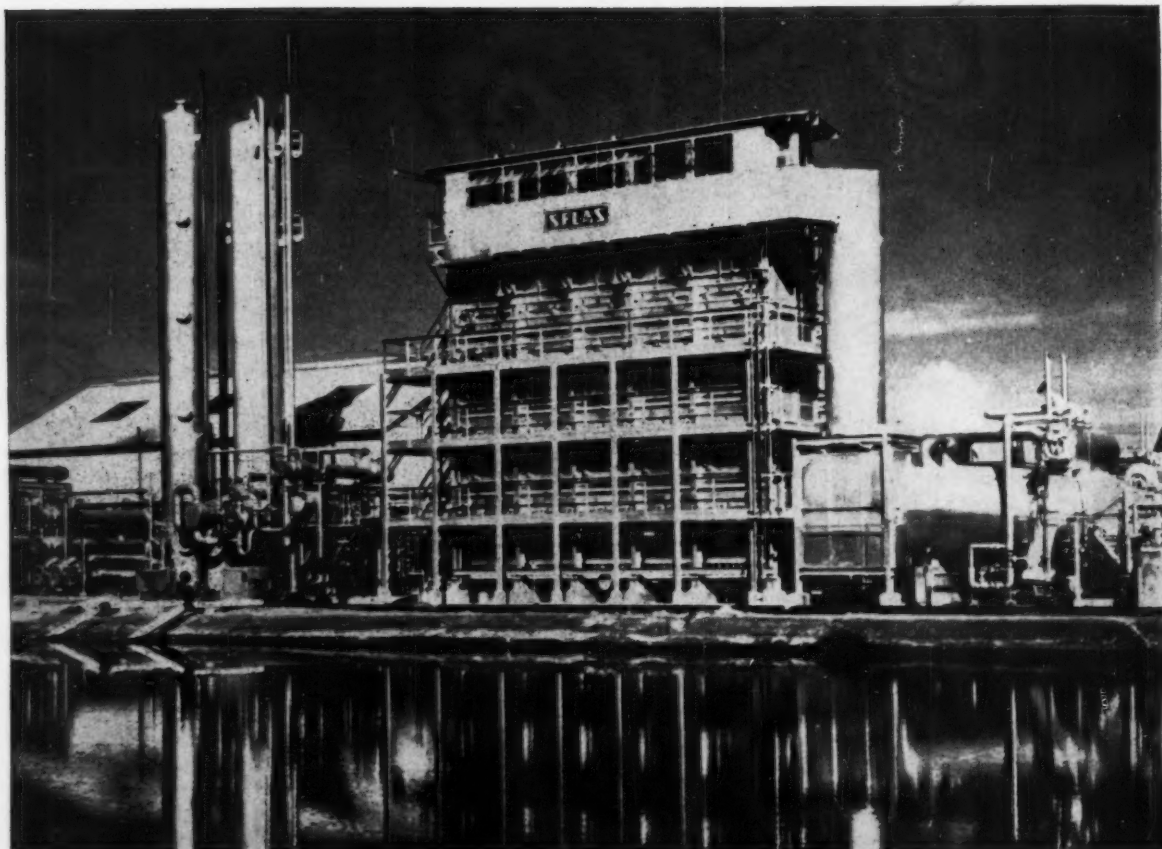
That there is a "threat" from nonchemical companies can be attributed in large measure to the activity of engineering-construction firms. Thanks to them, any refiner with a catalytic reformer (which produces hydrogen) can "buy" an ammonia plant and compete handily with old-line chemical companies. He can, if he wishes, make nitric acid or urea. A plastic molder, with no research of his own, can buy monomer and make his own polystyrene or polyvinyl.

In short, it means the chemical industry has been facing a brand-new sort of competition: from the firm that produces chemicals but which has no expensive, past research to write off.

Cutting prices may drive some of them off, of course. But, in the final analysis, this will do more harm than good. For lower prices inevitably mean lower profits and lower return on investment. And that, just as inevitably, cuts incentive for new research and for new chemical capital.

The prospects of more competition from companies outside the chemical industry may not be happy to contemplate. The important point to remember, however, is this: A firm "buying its way into chemicals" may seem to be off to a running start. Actually, the buying of a plant from an engineering-construction firm is only the first step. The buyer must develop skills in operating his plant, improving the process, servicing its products and carrying out its own research program for the future. Any firm that doesn't is bound to wither on the vine.

Any concern that does this is making its own contribution to chemical technology. In time, it will become a chemical company in good standing and eventually will be vocal in its complaints about competition from "nonchemical" companies.



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—2-methyl-1-butanol,  
commercial  
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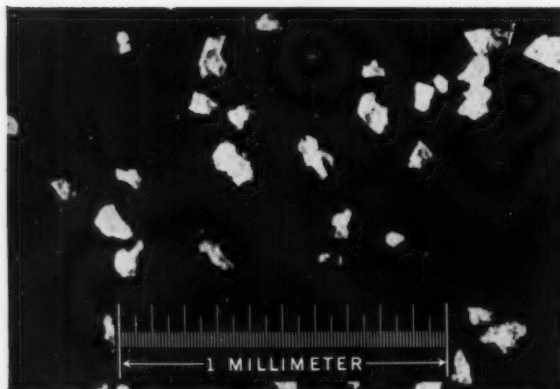
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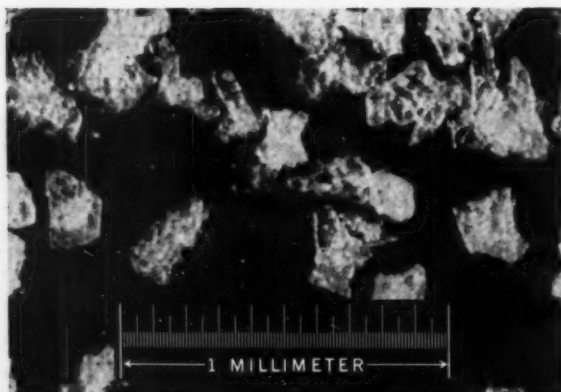
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100 Mesh.....5%	325 Mesh.....70.0%
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TYPICAL SCREEN ANALYSIS  
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100 Mesh.....5%	325 Mesh.....70.0%
170 Mesh.....20.0%	400 Mesh.....80.0%

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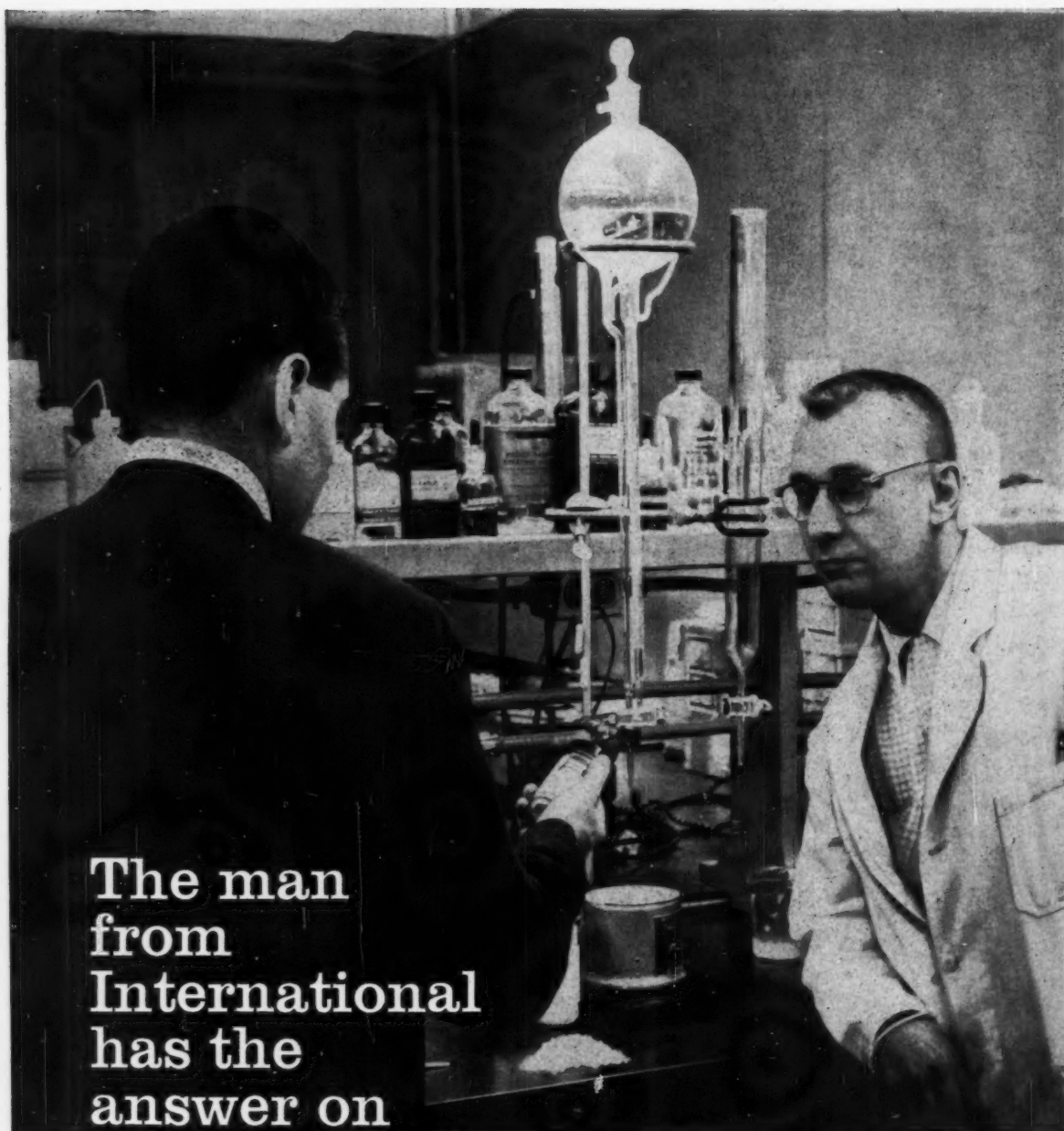
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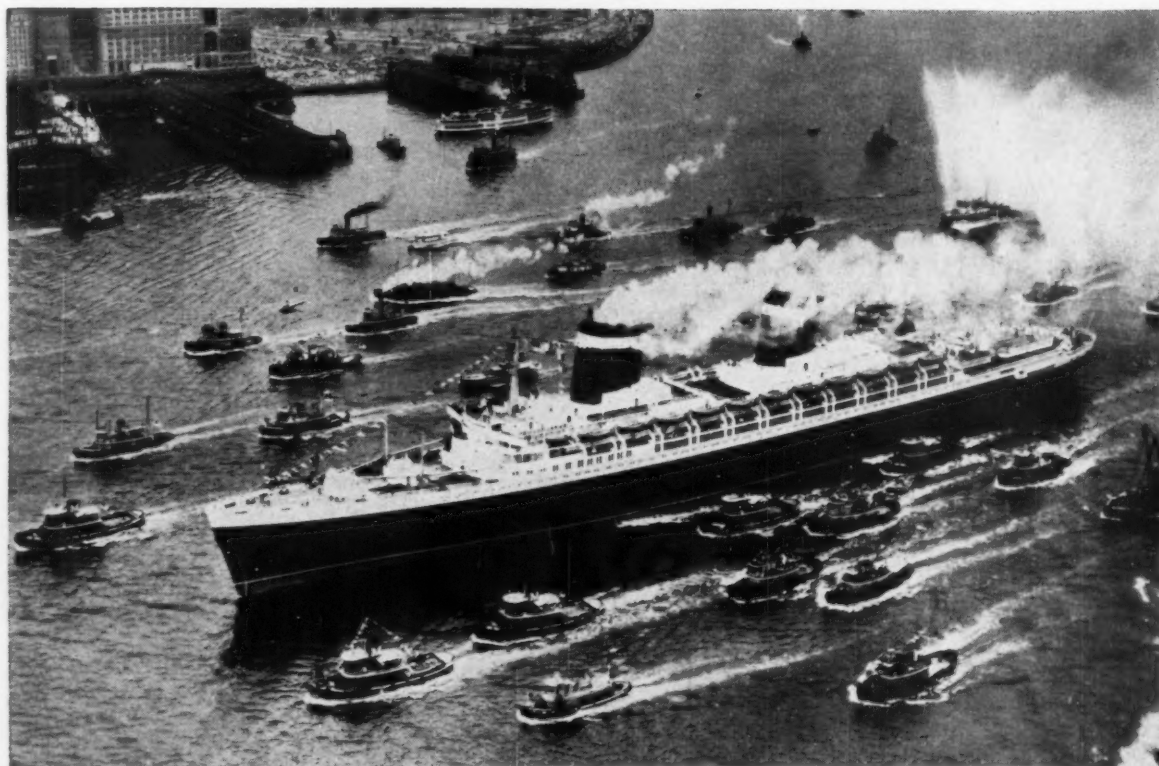
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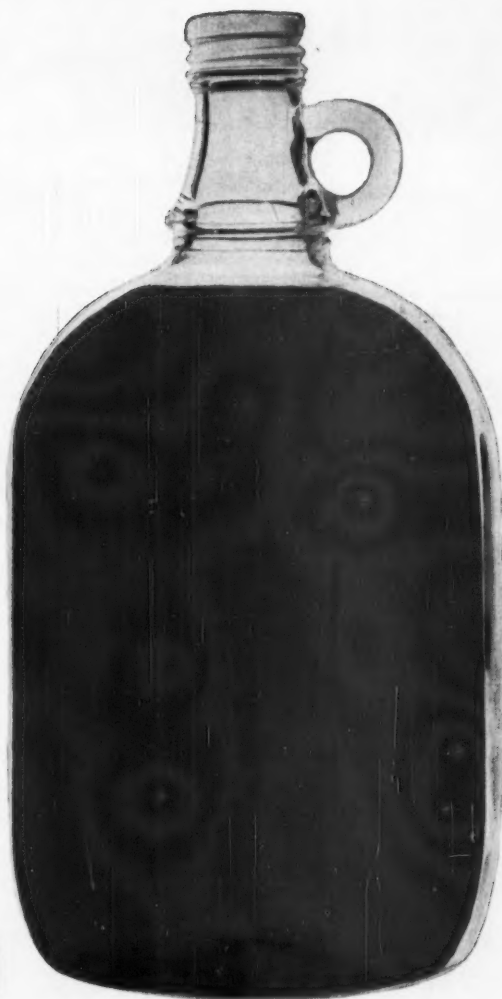
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Naphtha, H.A. ....	95
Turpentine.....	55
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(Another Diamond Alkali Success Story on Chlorine and Caustic Soda)

**One of Diamond's customers** was a manufacturer of laundry products and cleaners. He figured he could make his business larger by going into the laundry-bleach business.

After some investigation, he assembled equipment, ordered chlorine and caustic soda, and ran his first batch. It turned red, as did every other batch he ran.

A Diamond technical man was called in to run down the trouble . . . traced it to scale in a used heat exchanger. He showed the plant staff how to prepare equipment for handling caustic soda and chlorine, suggested improvements in their setup, helped get the process running smoothly.

If *you* use caustic soda, get to know the Diamond technical man. He not only saves customers money on shipping and handling problems, but he also

helps with their process problems. What he can't handle himself, he'll refer to the Diamond Research Center.

There is no finer caustic soda than Diamond's. There is no better service than Diamond's. No matter where your plant is located, you can get fast, economical delivery from one of Diamond's four strategically located producing plants. By truckloads, carloads or bargeloads.

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Bagpak Pallet by International Paper



*These tough pallets still do their job after long-haul shipment and months of snow and freezing temperatures.*

## Trial by weather!

International Paper Bagpak Pallets survive prolonged storage in snow and severe winter weather with no damage to multiwall bags.

**W**E DON'T recommend storing Bagpak Pallets in the snow. But when one of our up-state New York customers did, he learned the meaning of *real* protection.

The pallets in our photograph, travel-worn and weather-beaten but still completely serviceable, survived the rigors of shipment, *plus* exposure to winter weather for several months! When they were opened, *every* multiwall bag was safe and uniform.

And ready to do its job—no matter how tough.

International Paper pioneered this method of shipping and handling multiwalls. Our pallets now have four years of on-the-job experience.

And the Bagpak Pallet has a rigid construction that eliminates transit damage due to abrasion. Plus a square design that means a big saving in storage area.

Sixty-two years of papermaking

and materials-handling experience are compressed into every Bagpak Pallet. And these rugged pallets are only part of a *complete* multiwall packaging service offered to you by International Paper — world's most experienced papermaker.

Whatever your multiwall packaging needs, you will find it profitable to talk to your Bagpak packaging engineer. He has complete information. It's yours for the asking.



**INTERNATIONAL PAPER**

BAGPAK DIVISION • NEW YORK 17, N. Y.

## LETTERS

### Contract Extended

TO THE EDITOR: You report (*Business Newsletter*, Aug. 27) that National Lead Co. will continue to operate the Atomic Energy Commission's feed material plant at Fernald, O., through 1961. Actually the contract with AEC for operation of the plant was extended through June 30, 1965.

CARLTON H. ROSE  
Director of Public Relations  
National Lead Co.  
New York

### Protest but No Suit

TO THE EDITOR: We read with great interest your editorial titled "A Defense and a Caution" (July 23, p. 7) concerning the purchase of Italian tetracycline by the United States Military Medical Supply Agency.

By calling attention to a government procurement policy that tends to penalize research, vitiate patent rights, and promote unemployment within the pharmaceutical industry, you have rendered a distinct service. In the interest of accuracy, however, may I offer some clarification of other statements in your editorial?

Since only one company was mentioned in your editorial, the reader might conclude there was only one United States bidder on this contract. It is our understanding that there were several.

Second, while we have, as you state, protested MMSA's action, no company is suing the government in connection with this procurement, although, no doubt, such legal remedies as are available are being studied.

Your statement that under the Armed Forces Procurement Act, Defense Dept. officials are required to award contracts to foreign firms, when, all else being equal, the foreign price is lower, has misleading implications. Our understanding is that government procurement agencies are under no obligation whatsoever to seek competitive bids from foreign sources; whether they do so or not is solely a matter of policy. We are not aware of any Military Medical Supply Agency purchase from foreign sources prior to the tetracycline procurement in question.

Your comments on the magnitude of the American research effort and on the market disparity of wage rates

here and abroad are well made. However, we take exception to your statement that a 72% differential between the Italian purchase price and the lowest U.S. bid poses the question as to whether "the American pharmaceutical houses are not pricing their products disproportionately high." Perhaps the issues are not quite that simple.

An important fact to be considered is that the prevailing market price in Italy was more than 100% higher than the price paid by the government for its foreign-made tetracycline. Accordingly, it seems clear that this material was dumped in the United States in apparent violation of the Antidumping Act and at the expense of American labor and American industry.

It is not too difficult to suggest reasons why a foreign concern might be willing to sell substantial quantities of a product in the United States at prices far below what is considered fair and reasonable in its own country. To establish a marketing foothold, for example, a foreign supplier might be persuaded to sell very cheaply to an American customer such as the government.

Perhaps the issue is not whether drug prices in the United States are disproportionately high. More likely, it is whether the American pharmaceutical industry, if it is to be faced with foreign dumping and attacks on the patent system, can continue to maintain the burden of costly research and quality-controls programs that have contributed so much to the advancement of medical science and man's victory over once deadly diseases.

WILLIAM KLOEPFER, JR.  
Director of Public Information  
Pharmaceutical Manufacturers Assn.  
Washington, D.C.

### New Process in New Plants

TO THE EDITOR: I have been taken back a bit by your article "Bypassing the Crumbs Boosts Synthetic Rubber Process Payoff" (Aug. 20, p. 62).

An article with this encouraging title and a diagram that shows a one-step unit that does the same job as the existing SBR process along with the high hopes of revolutionizing synthetic rubber production really caught my interest. In fact, your cover goes

# BLOCKSON



# CATALOG

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Hydrogen Chloride Methyl Chloride  
Methylene Chloride Oleum Perchloroethylene  
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## LETTERS

so far as to state: "Crumbs get brush-off from unconventional new synthetic rubber process."

After pointing out all the advantages of a solvent rubber plant, suddenly in the last paragraph the author states: "Solvent-rubber plants are not expected to win out in competition with existing SBR plants."

Is this double talk?

R. J. DALY

Advertising Manager  
Columbian Carbon Co.

New York

*Not on careful reading. The key word is "existing." Although rubber makers won't scrap existing plants and put in the Beal-Crawford "desolventizer," this process instead of the crumb processes is likely to be installed in new plants. In fact, the first contract for the Beal-Crawford desolventizer has already been made—a semi-works plant for American Rubber & Chemical Co. (CW Business Newsletter, Sept. 3).—Ed.*

### Another Percent

TO THE EDITOR: We were very much interested in your article concerning the joint venture between Oronite and our company, Nippon Petrochemicals Co., Ltd. (NPCC) (July 9, p. 27).

However, we regret to say that it contained so many errors...

In the first place, the joint company established is Nippon Petroleum Detergent Co., Ltd., not Japan Oil Cleanser. Second, our company's name is not Japan Petrochemical. Third, Oronite will hold 45% interest, not 44%...

G. R. NEGISHI

Director

Nippon Petrochemicals Co., Ltd.  
Tokyo, Japan

### Silicon Rod Prices

TO THE EDITOR: Recently Dow Corning issued its first price list on silicon polycrystalline rod. Your comments in the Aug. 20 issue might lead to misunderstanding, and perhaps it will help your readers to have the facts clarified.

Markets for silicon single crystal and polycrystalline lump are well established with firm price scales. The market for polycrystalline silicon rod on the other hand, for all practical

purposes, has been nonexistent. The few prices that have been quoted have had the tentativeness natural in this stage of any product. At these prices it was uneconomical to zone-refine polycrystalline rods into single crystals. Users, therefore, bought single crystals or rods cast from polycrystalline lumps.

Our process, derived from Westinghouse and Siemens, produces high-purity polycrystalline rod suitable for zone refining. Its efficiency permits us to set realistic prices that will encourage zone refiners to purchase quality silicon instead of rods cast from polycrystalline lumps. Our prices, and the purity of our silicon, will make it attractive for some users to acquire float-zone equipment instead of extending their holdings of Czochralski crystal pullers.

Far from indulging in price cutting, Dow Corning is helping to open up a fresh market in the fast-growing semiconductor field.

E. L. WARRICK

Manager

Dow Corning Corp.

Hyper-Pure Silicon Division

Midland, Mich.

## MEETINGS

**American Chemical Society**, National meeting, New York, Sept. 11-16.

**Synthetic Organic Chemical Manufacturers Assn.**, meeting, Roosevelt Hotel, New York, Sept. 13.

**Chemical Exposition U.S.A. 1960**, Sept. 13-15, Hotel Statler Hilton, New York. Exposition held concurrently with 138th national meeting of the American Chemical Society. Admission to exhibits free to industry representatives.

**Western Petroleum Refiners Assn.**, meeting, industrial relations and refining technology; Henning Hotel, Casper, Wyo., Sept. 14-15.

**Engineering Management Conference**; theme: forces influencing engineering management, etc.; Morrison Hotel, Chicago, Sept. 15-16.

**Drug, Chemical & Allied Trades Assn.**, 70th annual meeting, Sagamore Hotel, Bolton Landing, Lake George, N. Y., Sept. 15-18.

**Chemical Market Research Assn.**; theme: "The European Chemical Industry"; Wentworth-by-the-Sea, Portsmouth, N. H., Sept. 22-23.

**American Ceramic Society**, electronics division meeting, Schroeder Hotel, Milwaukee, Wis., Sept. 22-23.

*Research is Digging!*





## Know Who Digs First?

Right...It's company officers and executives! Long before groundbreaking the company directors must foresee the need for new facilities. It is they who first decide to dig into capital for the dollars required to construct new laboratories, furnish laboratory "glass", pilot-plant equipment and materials, as well as payroll for the staff of top-notch chemists, engineers and professional scientists.

Recently, several Stauffer officials celebrated the start of construction on the company's newest research center at Richmond, California. The shovels used by the group are probably the world's most costly. They are made of an alloy of *ultra-pure* tungsten and *ultra-pure* tantalum produced by Stauffer-Temescal Company research in their electron beam furnaces.

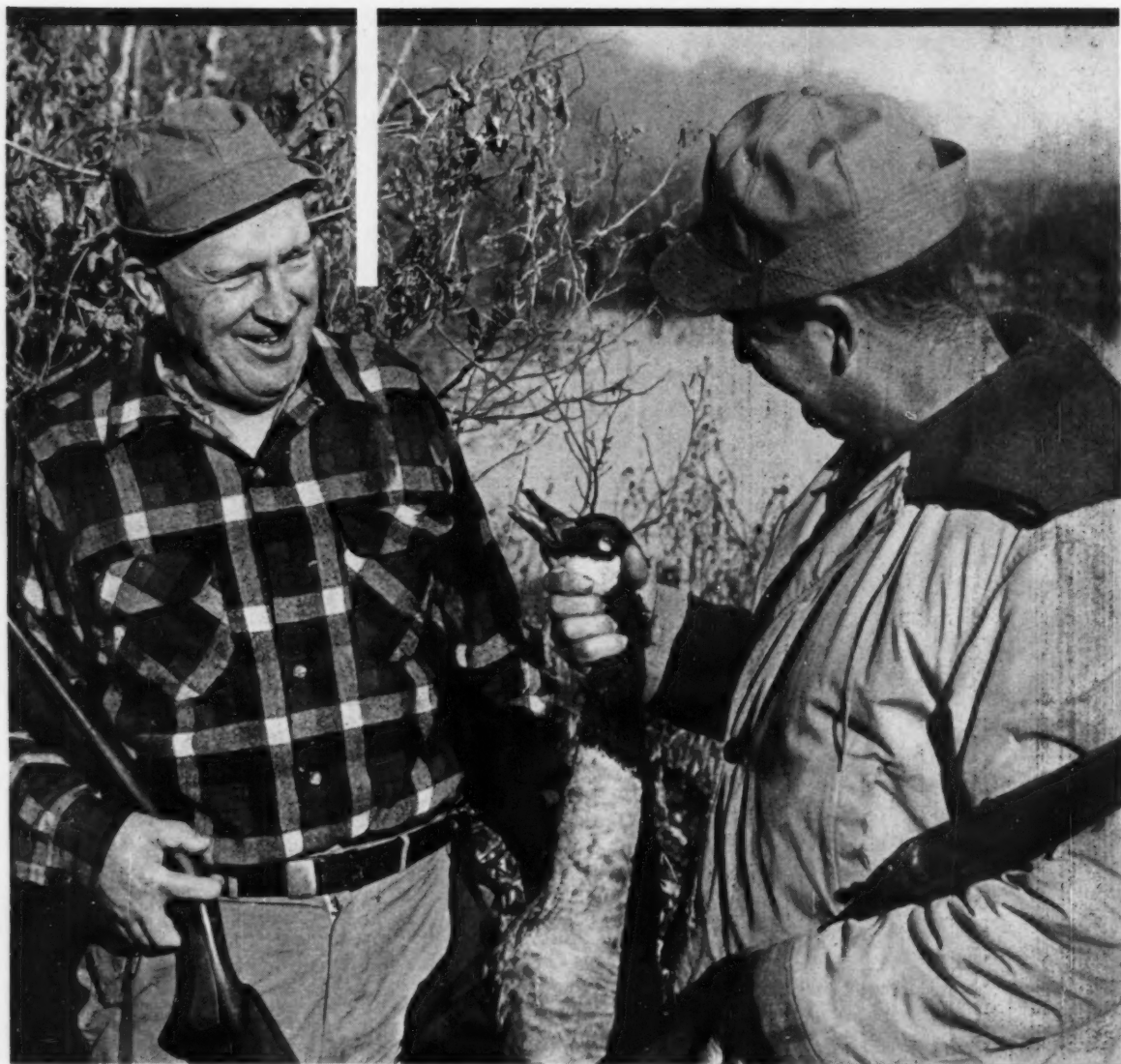
Alloys of these and other refractory metals will have many strategic applications as research reveals the amazing properties of chemically pure metals. The

tungsten-tantalum alloys find immediate application in critical rocket components like nozzles for rocket engines, which must survive the heat and erosive effects of flaming gas ejected at tremendous speeds. These alloys also have potential application as leading edges of glide re-entry missiles. A major advantage is that they retain a high degree of mechanical strength at temperatures in excess of 4000°F. Unlike other refractory metals, they can be fabricated and machined on conventional steel-working equipment. Moreover, these electron beam-refined alloys can be reheated and welded without loss of workability.

The new technique of creating *ultra-pure* metals is but one example of how Stauffer is digging into the application of chemical elements and compounds to the needs of science, industry and agriculture. Stauffer Chemical Company, New York 17, N. Y.



"And we can still be at the new plant before nine!"



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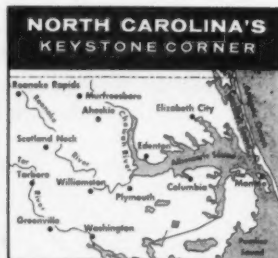


**VIRGINIA ELECTRIC and POWER COMPANY**

Clark P. Spellman, Manager—Area Development, Electric Building, Richmond 9, Virginia • Milton 9-1411

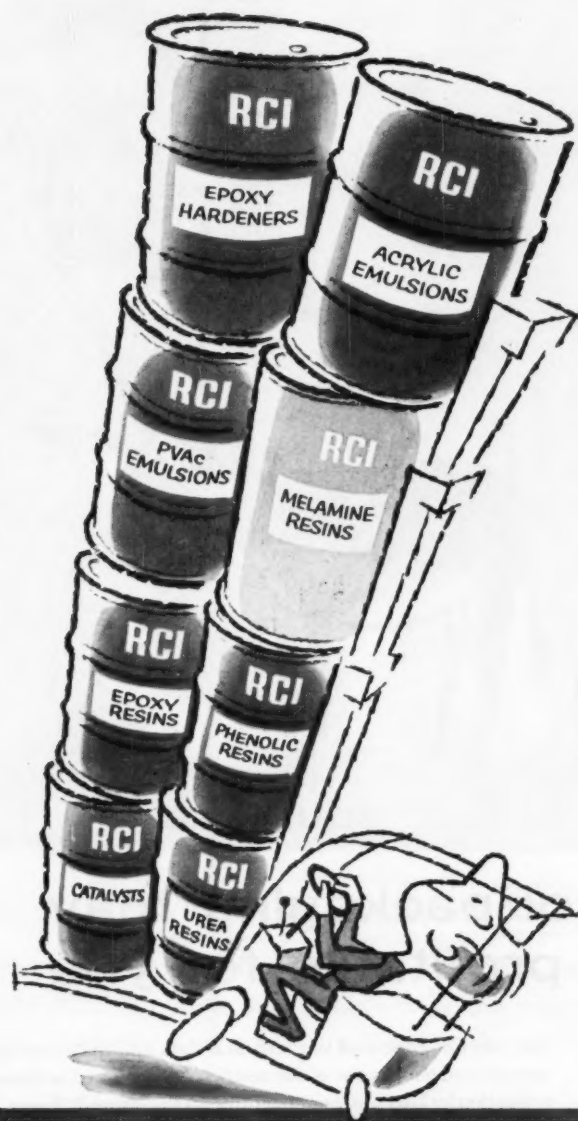
SERVING THE TOP-OF-THE-SOUTH WITH 1,990,000 KILOWATTS — DUE TO REACH 2,580,000 KILOWATTS BY 1962

20 CHEMICAL WEEK September 10, 1960



Formulating Adhesives?

Make **RCI** your single source for resins—and save with a lower RMC\*



Single-source buying of adhesive resins from RCI offers these distinct advantages:

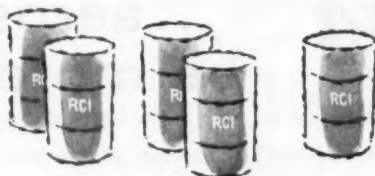
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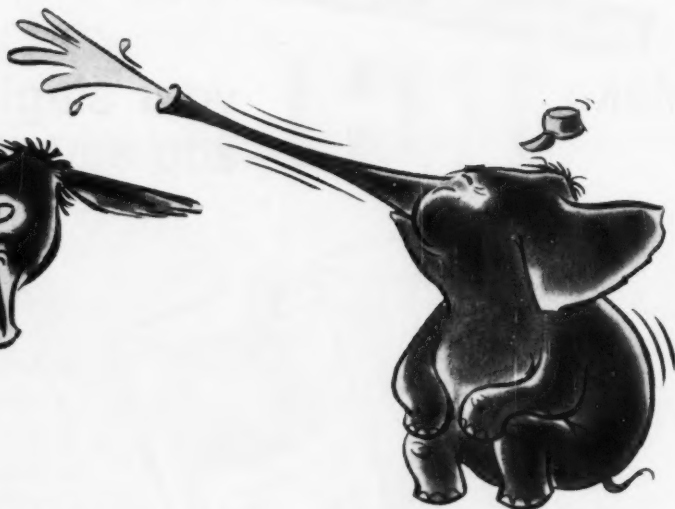
Synthetic Resins • Chemical Colors • Industrial Adhesives • Phenol • Hydrochloric Acid  
Formaldehyde • Phthalic Anhydride • Maleic Anhydride • Ortho-Phenylphenol • Sodium Sulfite  
Pentaerythritol • Pentachlorophenol • Sodium Pentachlorophenate • Sulfuric Acid • Methanol

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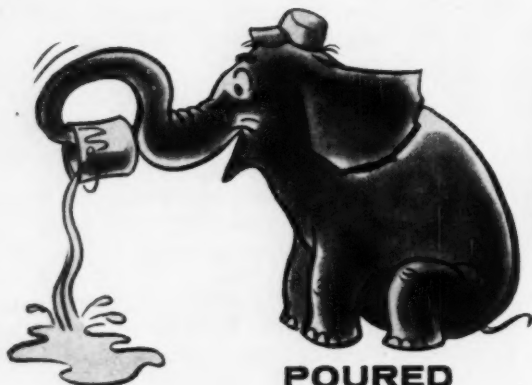
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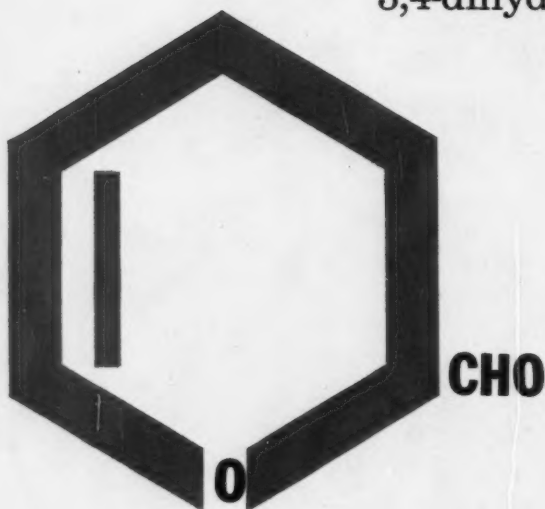
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# Acrolein Dimer

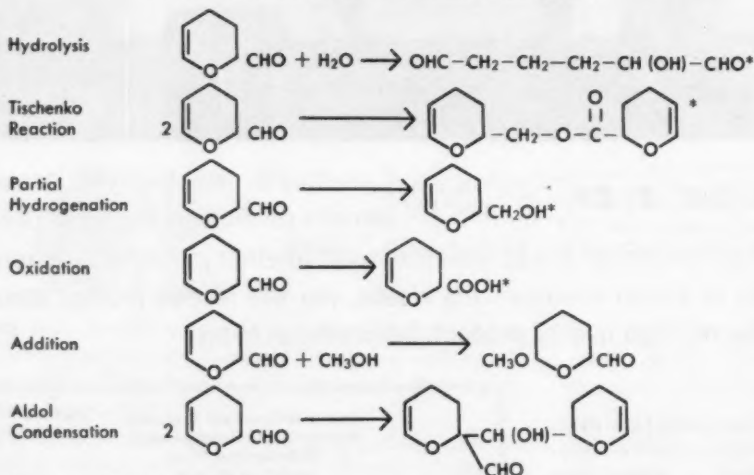
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# Business Newsletter

CHEMICAL WEEK  
September 10, 1960

**CPI growth continues**, both at home and abroad (*see p. 29*), although industry management is not looking for big improvement in business conditions over the next year or so. Among newest projects:

- Collier Carbon & Chemical and Tidewater Oil are planning to build and operate a second multimillion-dollar petroleum naphthalene plant. The proposed new facility will be built at Collier's Los Angeles plant and is scheduled for completion in late '61. It will have an initial capacity in excess of 50 million lbs./year. Their first petronaphthalene joint venture—also 50-million-lbs./year capacity—will be at Tidewater's refinery near Wilmington, Del.

- Dow Badische Chemical (Freeport, Tex.) will add facilities to produce n-butanol and isobutanol, for use in lacquer and resin solvents, with first shipments to be made early in '61. The plant is now producing acrylic acid and esters, will later produce caprolactam for Dow's nylon tire-cord project.

- Stauffer Chemical is planning a phosphate fertilizer plant at Vernal, Utah. It will use phosphates from the nearby mining and beneficiating units to be built by San Francisco Chemical, a Stauffer affiliate (*CW Business Newsletter, March 26*).

•  
**Another spate of mergers** will be moving through various stages of formalization this week. The list includes:

- National Distillers' merger with Federal Chemical (Louisville, Ky.), producer of mixed fertilizers at six plants in Kentucky, Tennessee, Illinois, Indiana and Ohio.

- Metal & Thermit's acquisition of Orefrac Minerals, South Carolina supplier of granular and dry-milled zircon for the foundry, refractory, ceramic and glass industries, for \$1 million in cash.

•  
**Chemical companies figure in two suspense-filled "Westerns"** this week.

- In Wyoming, Union Carbide has started a guessing-game as to its intentions in taking an option on 9,000 acres in the north-central part of the state to explore coal deposits. The two tracts under option are adjacent to the holdings of Reynolds Metals, which has been doing feasibility studies on utilization of the vast low-grade coal deposits in that area in connection with a proposed aluminum reduction plant.

- And in Utah, the big potash mining and refining project proposed by Texas Gulf Sulphur (*CW, Aug. 20, p. 25*) is running into opposition from the oil and gas companies. The U.S. Dept. of the Interior has invited comment on a move to withdraw the potash-bearing public lands from oil and gas leasing so that Texas Gulf would be able to carry out its potash plans; and the 1,200-member Rocky Mountain Oil and Gas Assn. has indicated that it will have plenty of comments to voice.

## **Business**

### **Newsletter**

(Continued)

#### **Du Pont edges closer toward possible entry in polypropylene**

this week with formation of a Polyolefin Division within its Polychemicals Dept. The new division—to be headed by Roy Schuyler, assistant sales director for Polychemicals—will consolidate marketing, production, and research and development efforts in the field of polyolefin plastics. It will take over the conventional polyethylene plant at Orange, Tex.; the conventional PE plant at Victoria, Tex., which is expected to come into production early next year; the relatively small plant for conventional PE at Parkersburg, W. Va.; and the linear (high-density) polyethylene plant that's now in startup phase at Orange. Also, the new division "will be responsible for research and development programs on other polyolefins."

#### **Polypropylene fiber development is picking up steam.**

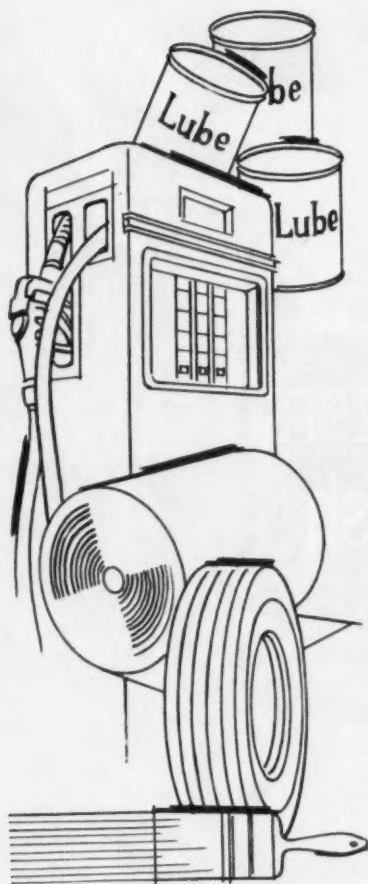
In Europe, Imperial Chemical Industries (London) has just taken out an exclusive license to produce polypropylene fibers in the United Kingdom under Montecatini (Milan) patents and technology. ICI's 10,000-tons/year polypropylene resin plant at Wilton is nearly completed, and the company is moving ahead to build a fiber plant. Montecatini is already operating a 12-million-lbs./year polypropylene staple fiber plant at Terni, Italy, and expects to expand the plant's capacity fivefold by '62.

In the U.S., producers of polypropylene resin are optimistically pushing fiber and filament development. AviSun is turning out fibers on a pilot-plant basis, expects to have its commercial fibers plant at New Castle, Del., onstream about one year from now. Outsiders predict its capacity will be in the neighborhood of 10 million lbs./year. AviSun's Donald Fiedler—product manager for fibers—foresees a U.S. market of anywhere from 200 million to 1 billion/lbs. year for polypropylene fibers within 10 years, with home carpets as the first big application.

**ICI also is linking up for technical skill in boron.** The big British concern has entered into an exchange-of-information agreement with Callery Chemical (Pittsburgh). The deal calls for trading assessment data in certain areas of boron chemistry "with a view to the acquisition by either party of nonexclusive, royalty-bearing licenses under the other party's patents, as requested." Callery says it's nearly ready to start production of pentaborane for U.S. Air Force at the government-owned propellants plant at Muskogee, Okla.

**Are your employees active in the political campaign?** One chemical company that can answer with an unhesitating "yes" is Hercules Powder. Two members of its legal department are running for major public offices this fall. In last week's state Republican convention, William Roth and Gerald Kavanaugh were nominated as candidates for lieutenant governor of Delaware and mayor of Wilmington, respectively. Roth has been serving his party as national vice-chairman of the Active Young Republicans organization.

# QO<sup>®</sup> Furfural offers Montage of uses as a selective solvent



Just as a montage is a composite illustration to an artist—QO furfural offers a composite of solvent extraction ideas for the chemical engineer. Furfural is highly polar which favors sharp separations of saturates from unsaturates in lube oils, gas oils, cycle stocks and other petroleum products as well as wood rosin, glycerides, butadiene. Supplementing the basic advantage of preferential solubility, furfural is easy to reclaim, easy to handle, and easy to buy.

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**Butadiene:** In the purification of butadiene, furfural alters relative volatilities of butadiene and other C<sub>4</sub> hydrocarbons. This permits easy fractionation of compounds differing in degree of unsaturation to give good yields of high purity butadiene.

**Glycerides:** Glyceride oils may be separated by solvent extraction with furfural. Furfural selectively removes unsaturated glycerides from saturated ones.

If you have a separation problem, furfural may well be your answer. Write for information indicating nature of material to be extracted.

## The Quaker Oats Company

### CHEMICALS DIVISION



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Imperial Chemical Industries, Ltd., London, England

**In Europe:**  
Quaker Oats-Graanproducten N. V., Rotterdam, The Netherlands;  
Quaker Oats (France) S. A., 3, Rue Pillet-Will, Paris IX, France;  
A/S "Ota", Copenhagen, S. Denmark

**In Australia:**  
Swift & Company, Ltd., Sydney

**In Japan:**  
F. Kanematsu & Company, Ltd., Tokyo



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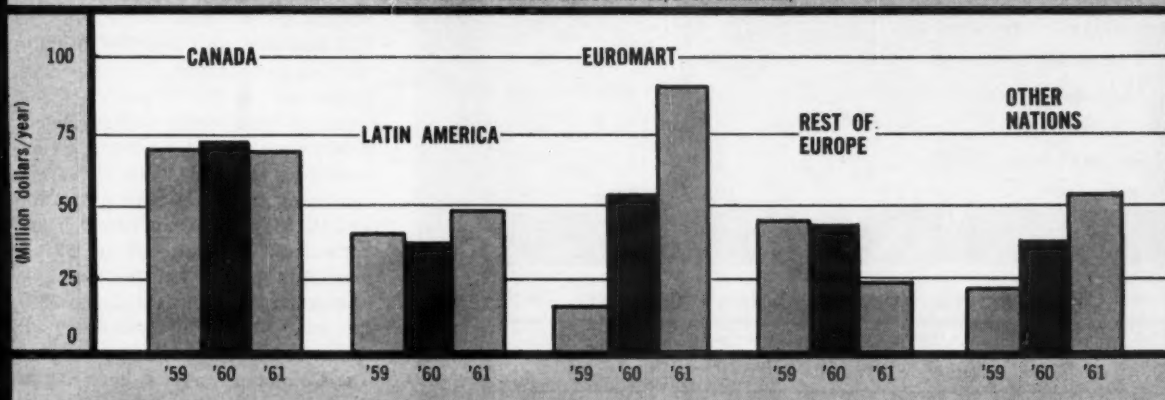
**JOB OPPORTUNITIES:** Immediate openings exist in the FMC Chemical Divisions for Chemists and Chemical Engineers at all levels of experience. If interested, call or write our technical recruitment manager in New York.

PRODUCTS OF THE FMC CHEMICAL DIVISIONS: BECCO CHEMICAL DIVISION—hydrogen peroxide and peroxygen chemicals; CHEMICALS & PLASTICS DIVISION—DAPON<sup>®</sup> and OXIRON resins, plasticizers and organic chemicals; CHLOR-ALKALI DIVISION—alkalis, solvents, and chlorinated products; NIAGARA CHEMICAL DIVISION—agricultural chemicals and pesticides; MINERAL PRODUCTS DIVISION—phosphates, barium and magnesium chemicals. Our 34-page brochure describing hundreds of FMC chemical products available on request.

1.

## Big Shift is to Common Market Countries

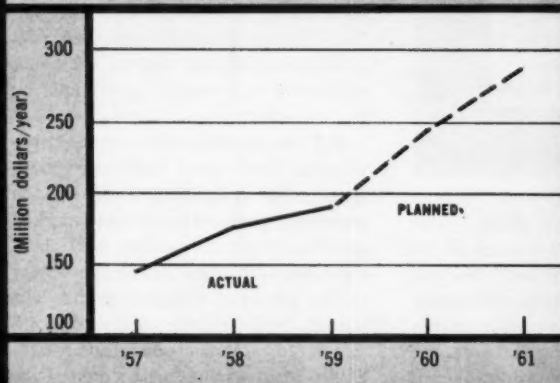
(U.S. chemical companies' actual and planned capital expenditures abroad. Source: McGraw-Hill Dept. of Economics.)



2.

## Outlays Rise 100% in 4 Years

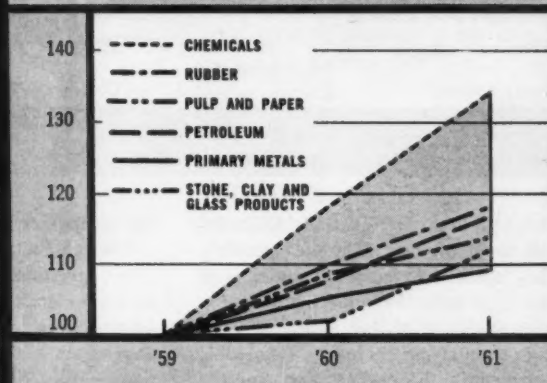
(U.S. chemical companies' actual and planned capital expenditures abroad. Source: McGraw-Hill Dept. of Economics.)



3.

## Sales Spurt for Foreign Units

(Expected increases in sales of U.S. CPI companies' foreign subsidiaries. Index: 1959 sales = 100. Source: McGraw-Hill Dept. of Economics.)



# Totaling Foreign Investment Tab

U.S. chemical companies will increase their investment in the European Common Market this year and next and boost their total overseas capital spending to record highs. They expect gains in sales by their overseas subsidiaries to more than make up

for leveling-off of exports in '61.

Those are key findings of the second annual Survey of Foreign Operations, conducted by McGraw-Hill's Dept. of Economics. The companies responding to the survey account for an estimated 75% of annual overseas

expenditures of U.S. manufacturing and petroleum corporations.

After hiking their overseas capital spending 21% in '58, the chemical companies in the survey planned to raise '59 expenditures another 14% when they were queried halfway

## Bigger Stakes in Business Abroad

(Foreign capital expenditures by U.S. companies, in million dollars/year. Source: McGraw-Hill Dept. of Economics.)

Industry Groups	ACTUAL			PLANNED	
	1957	'58	'59	'60	'61
Manufacturing and petroleum companies	2,504.5	2,037.4	2,077.7	2,395.2	2,547.6
Chemical process industries:					
Chemicals & allied products	147.5	178.5	191.0	256.4	285.8
Pulp and paper products	60.5	29.6	31.0	31.0	32.2
Rubber products	61.5	51.0	54.5	56.7	65.8
Stone, clay & glass products	22.1	25.0	12.9	17.7	14.5
Primary metals	155.2	127.7	104.5	81.5	88.8

## CPI Exports: Further Gains Forecast

(U.S. CPI companies' export sales, in million dollars/year. Source: McGraw-Hill Dept. of Economics.)

Industry Groups	ACTUAL		EXPECTED	
	1958	'59	'60	'61
Chemicals and allied products	1,476.2	1,600.9	1,889.1	1,945.8
Pulp and paper products	303.6	337.1	347.2	361.1
Rubber products	278.3	326.5	375.5	356.7
Stone, clay and glass products	295.4	308.8	339.7	377.1
Petroleum products	461.8	402.2	418.3	414.1
Primary metals	908.0	667.9	781.4	804.8

through the year. Instead, following the trend of their domestic spending, they spent 6% less than anticipated, bringing their '59 total up only 7% over the '58 level. For all manufacturing companies surveyed (excluding petroleum), the cutback on expected '59 spending was about 2%.

**Making It Up:** But chemical producers, along with other manufacturers, will easily make up for the cutback this year. While the chemical companies spent \$12.5 million less than they planned to in '59, they now expect to spend \$71.4 million more this year than they predicted they would a year ago—boosting spending in '60 to \$246.4 million, 29% over the '59 total.

In '61 they expect to boost outlays an additional 16%, to \$285.8 million. If business abroad holds up, this total may well be pushed higher as

the companies firm their plans.

**Uneven Pattern:** For the rest of the CPI, investment plans are uneven. Primary-metals producers (including some mining concerns) plan to cut expenditures 22% this year, but raise them 9% in '61. Paper producers will hold expenditure level this year, and boost them 3.8% in '61. The rubber industry plans a slight increase in '60—4%—then a 16% boost next year. Stone, clay and glass makers see a 37% rise this year, an 18% cut in '61. And the petroleum industry will raise outlays 11% in '60, but cut them 2% in '61.

Apparently, much of this year's foreign investment planned by the chemical companies will lay the groundwork for next year's projects. Last year the chemical companies spent \$11.5 million—6% of their total foreign expenditures—on land and

existing facilities. This year they figure to devote 18%—\$44.3 million—of the total on such expenditures. In '61 the outlay will drop to \$22.8 million—only 7.8% of the total—while total outlays on new plants are higher than ever before.

**The Big Swing:** The most striking pattern in overseas investments by U.S. manufacturers is the big swing to the Common Market. Chemical companies are in the vanguard of this trend. In '59 the manufacturing companies put 17% of their foreign expenditures into the Common Market. They plan to increase this proportion to 24% in '60, 27% in '61. Chemical companies, with only 8% of '59 expenditures tagged for the Common Market, expect to boost them to 22% this year, 32% in '61.

The reason for this swing is clear. The Common Market is emerging as the largest single market outside the U.S. And as it integrates, its trade barriers will make it less accessible to U.S. exports.

New market opportunities are the most important factor spurring foreign investment by the companies queried. Of the chemical companies surveyed, 43% cited new markets as the primary factor determining their decision. For all corporations surveyed, 48% were primarily motivated by this consideration.

But the chemical industry is more worried than other industries about rising trade restrictions: 38% of the chemical companies voiced marked trepidation on this score; only 16% considered this their prime concern.

The promise of higher profits persuaded 14% of the chemical companies to invest abroad, and availability of raw materials accounted for another 14%. Lower labor costs and competition each were the most important factor for 9% of the chemical companies.

The payoff of these investment decisions should be very apparent next year. This year the chemical companies expect their exports to rise a healthy 18%. But—partly because of their own investment activities overseas—they believe the boom will level out in '61—rising only 3%. Sales of these companies' overseas subsidiaries will at least partly compensate for this. They're expected to rise 18% this year, 14% in '61.

## Growing in Adversity

Last week one major lithium producer decided to skip its third-quarter dividend payment; another disclosed that its first-half operations resulted in a \$13,867 net loss; and a third is nearing the end of deliveries to its only significant customer. Nevertheless, the theme in this hard-hit industry continues to be optimism and expansion.

Foote Mineral's board of directors voted to omit payment of a third-quarter dividend. First-half sales were down nearly 27% and earnings 60%—both because Foote is no longer selling lithium carbonate to the Atomic Energy Commission and because the steel industry is operating at such a low level the ferroalloy business is in the doldrums.

Lithium Corp. of America—which earned \$442,587 on sales of \$5.7 million during first-half '59—has been operating in the red this year, with first-half sales down nearly 60%, to \$2.3 million. It's paying \$1.9 million in settlement of a lawsuit.

American Lithium Chemicals — 56.7%-owned by American Potash & Chemical—is now in the last four months of its five-year contract with AEC. No renewal is expected.

Yet all these companies are researching and expanding—in lithium and in their other lines.

**Money for Growth:** LCA is preparing to offer \$2.3 million worth of convertible subordinated debentures. While nearly half of net proceeds would be used to retire \$925,000 worth of convertible debentures due in '64, about \$125,000 is earmarked for purchase of mining equipment for lithium operations in North Carolina and about \$75,000 will be invested in construction of a new unit to produce butyl lithium.

Foote is completing construction of a \$2-million research and technical center at Exton, Pa., and its research program will continue to lay heaviest stress on lithium products and applications.

An American Potash affiliate has purchased additional lithium ores in Africa and is gearing for growing sales of lithium products to glassmakers and other users. And Quebec Lithium—also hurt by the stop in AEC buying—is putting a new lithium salts plant onstream.



3M's McKnight: His company's merger stresses product diversification.



Dow's Doan: Seeks integration, steadier profits through Allied merger.

## New Faces in Drug Industry

Two major CPI companies—Dow Chemical and Minnesota Mining and Manufacturing—are moving to further diversify their operations by acquiring two leading U.S. pharmaceutical companies: Allied Laboratories and Warner-Lambert Pharmaceutical, respectively.

These proposed mergers would parallel in significance the landmark chemical-pharmaceutical mergers of American Cyanamid and Lederle Laboratories (1930) and Olin Mathieson and E. R. Squibb ('52). As a result, both Dow and 3M will be acquiring "recession insurance" in the form of drug operations whose profits tend to remain stable while those of companies in other industries slide.

Directors of Dow and Allied Laboratories last week approved a proposal for the merger of the two companies, subject to ratification by Allied stockholders at a special meeting Nov. 30 at Wilmington, Del.

If the proposal is approved, Dow will distribute two-thirds of a share of its common stock for each share of Allied stock. Based on recent stock prices, this would be about \$45 million worth of Dow stock for the 796,856 Allied outstanding June 30.

Under terms of the agreement, Allied Laboratories would continue to operate under its present officers as a division of Dow Chemical.

Minnesota Mining expects to complete arrangements for the acquisition of W-L before the end of the year.

If stockholders of both companies ratify the plan, 3M will issue one-half share of its common stock and one share of a special Class A voting stock for each share of Warner-Lambert common. The Class A stock would provide a means to pay each W-L stockholder a '60 dividend return from the combined company equal to that which he probably would have received from W-L alone. The Class A stock may be converted, at the stockholder's option, into three-fifths of a share of 3M common. Since W-L has about 5,260,000 shares outstanding, the deal would involve commitment of 3M stock with a present market value of about \$400 million.

In both proposed mergers, areas of integration of operations are evident. Dow ag chemicals—sales were up 10%, to about \$47 million the past fiscal year—could dovetail with Allied veterinary products. And 3M research could lead to development of chemicals for use in medicine, pharmacy.

Operating results for these companies in their latest fiscal years (sales and earnings, respectively): Dow, \$781 million, \$82 million; Allied, \$30 million, \$2 million; 3M, \$500 million, \$63 million; Warner-Lambert, \$190 million, \$16 million.



Monsanto's Smith: New division hopes to hoist company's ag chem sales.



Monsanto's Morris: New plant may make company biggest in phthalic.

## Leading from Strength

In a get-up-and-go mood last week, Monsanto Chemical took steps to bolster its already big stakes in two major fields:

- The company decided to build a multimillion-dollar plant in New Jersey to produce phthalic anhydride and phthalate ester plasticizers. This plant—to be completed early in '62—will increase Monsanto's phthalic capacity by more than 30%, its phthalate ester capacity by more than 50%.

- The company set up a new operating division, Agricultural Chemicals Division, to consolidate and strengthen marketing, research, development and manufacturing functions relating to fertilizers, pesticides, and animal feed supplements. This work had been split between the Organic and Inorganic Chemical divisions.

**Tops in Phthalic?** Since industry sources estimate Monsanto's present phthalic capacity (at Everett, Mass., and St. Louis) at about 120 million lbs./year, the new plant in Gloucester County, New Jersey (near Gibbstown), could raise the firm's total to more than 155 million lbs./year. Right now the largest U.S. producer of phthalic is Allied Chemical's Plastics and Coal Chemicals Division; its capacity is about 150 million lbs./year.

With U.S. phthalic producers operating at close to 80% of capacity in first-half '60, this year's output may

amount to 390-400 million lbs., compared with last year's 360 million lbs. But production has been limited by a shortage of the principal raw material, naphthalene, which is produced largely as a by-product from steel-makers' coke ovens. Causing the scarcity: last year's steel strike and this year's low rate of operation in that industry.

But Monsanto is confident that bigger things are ahead for phthalic. Vice-President Robert Morris—general manager of the company's Organic Chemicals Division—predicts that U.S. demand for this product should top 450 million lbs./year by '65. Principal outlets: in alkyd resins for surface coatings, polyester resins for reinforced plastics, and plasticizers for vinyl plastics.

**Nearby Naphthalene:** One thing Monsanto is banking on is a firm and ample supply of naphthalene. A major factor here, Morris points out, is that several new plants to produce naphthalene from petroleum are slated to be operating by the time Monsanto's new plant comes onstream in '62 (*CW*, June 25, p. 95).

At least one of these new petronaphthalene plants will be conveniently close to Monsanto's new phthalic plant, which will be on a 650-acre tract on the Delaware River just across from Chester, Pa. The

naphthalene plant being built by Tidewater Oil and Collier Carbon and Chemical—with initial capacity estimated at more than 50 million lbs./year—will be at Tidewater's Delaware City, Del., refinery, about 25 miles downstream from the Monsanto site, and is scheduled to be operating by the end of '61. And it's known that a petronaphthalene unit is being considered for one of the refineries even closer to Chester.

**New Divisional Lineup:** Heading the new Agricultural Chemicals Division will be Tom Smith, Jr., who rose through the sales ranks to assistant general manager of the Inorganic Chemicals Division (formerly known as the Phosphate Division).

Manufacture of ag chemicals has become of prime importance to Monsanto in recent years, accounting for 11.5%—about 93.3 million—of last year's total corporate sales volume. And with two divisions selling to farm markets, selling costs per product were high.

Monsanto hopes the new division—with its salesmen handling all ag chemicals—will lead to lower marketing costs. This is important in markets such as ammonia and ammonium nitrate, where price competition and co-op competition are severe.

Also, the new division should make possible more effective promotion to farm groups such as 4-H clubs. This is regarded as an important tool in farm marketing; but there were problems in getting the two divisions to agree on programs and cost sharing.

At the outset, the new division will take over operation of the chemical plant at El Dorado, Ark., and the Barton plant at Luling, La.—both previously operated by the Lion Oil Co. Division. Its major product lines will be nitrogen and phosphorus fertilizer materials. Smith notes that Monsanto is regarded as the world's largest producer of elemental phosphorus and one of the larger producers of nitrogen products.

The moves to enhance Monsanto's status in phthalic and fertilizer circles come just a week after completion of expansion that likely makes it the world's largest producer of maleic anhydride (*CW*, Sept. 3, p. 92). Together, they suggest that this year at least, Monsanto intends to invest for growth primarily in those areas in which the company is already strong.

## Blocking the Mergers

Recent antitrust actions by the Federal Trade Commission and the Justice Dept. last week spiked a merger move by Union Bag-Camp Paper Corp., and are discouraging similar moves by other pulp and paper companies. Moreover, industry reaction indicates papermakers feel they have become favorite targets for the government's antimerger patrol.

Antitrust proceedings instituted by the FTC earlier this summer, plus the fear that a new merger would draw another legal salvo, have caused Union Bag-Camp to cancel its plans to purchase Crossett Co., Arkansas producer of forest products (including methanol and other chemicals). Crossett President Peter Watzek said Union Bag-Camp has been unable to arrange satisfactory terms to finance the reported \$156-million transaction partly because of the antitrust proceedings.

Officials of the two companies had signed an agreement last spring to investigate the possibility of Union's purchase of 2,279,640 shares of Crossett common at \$68.50/share (*CW Business Newsletter*, May 21).

The FTC had earlier attacked the '56 merger of Union Bag and Paper Corp. and Camp Mfg. Co. In a mid-June complaint, it charged that this merger had damaged competition in the paper industry.

**Boxed In:** In other major antitrust actions involving pulp and paper companies, FTC charged: Indiana Container Corp. with unlawful acquisition of General Box's Louisville, Ky., plant; Scott Paper Co. with illegal acquisition of Soundview Pulp Co., Detroit Sulphite Pulp & Paper Co., and Hollingsworth & Whitney Co.; also, Crown Zellerbach Corp. with illegal acquisition of St. Helens Pulp & Paper Co.

The Justice Dept.'s Antitrust Division also has been active in this field. Its lawyers accused Continental Can of illegal acquisition of Robert Gair, manufacturer of paper board, paper containers, and flexible packaging products; and Owens-Illinois Glass of illegal acquisition of National Container Corp., producer of corrugated shipping containers.

In a suit to enforce reporting requirements, FTC won a decision against St. Regis Paper; but St. Regis is appealing the ruling.



Ray Fish's Fish International wants to make SBR in Argentina, but . . .



John Fennebresque's Texas Butadiene has already government approval.

## Rumpus Over Rubber

**Rival plans for building Argentina's first synthetic rubber plant have stirred bad feelings and bitter words between several U.S. Companies.**

Texas Butadiene proposes to build a \$38-39-million complex to produce SBR-type rubber, butadiene, and carbon black (*CW Business Newsletter*, Aug. 27); in contention is a proposal for a \$74.5-million rubber and petrochemical complex, put forward by a group composed of Fish International (Houston), Continental Oil, Cities Service, U.S. Rubber, and Witco Chemical (*CW Business Newsletter*, Sept. 3). Fish International heads this quintet.

Here is the background.

Fish filed a preliminary proposal early in '58 to build an SBR and petrochemical complex at San Lorenzo, just north of Buenos Aires.

Early in '59 the government asked Fish to propose a plant for Southern Argentina instead, in line with its industrialization program for that region. Fish declined, on the grounds that the project in northern Argentina was more feasible.

In April '59 Texas filed a proposal for building its project in the South. In September the government issued the firm a decree authorizing the project, conditional on its having arranged for financing, raw materials, and site approval.

Fish finally got a decree, in Feb.

'60, authorizing multiproduct "Petrochemical complex integrated by plants for development of cis-polybutadiene and/or polyisoprene," also conditional on approval of finance, raw materials and site.

In line with its decree, Texas Butadiene filed its detailed plans for the project on Aug. 12. It had decided to build the 60,000-tons/year rubber plant at Puerto Deseado, Santa Cruz province, had already signed a contract with the provincial government for the latter to supply water, utilities and fuel from a 123-mile natural gas pipeline to be built by Santa Cruz.

The ruckus started when the Fish group filed its plans on Aug. 22. Although its decree specifically called for a "cis-polybutadiene and/or polyisoprene" plant—which would not have conflicted with Texas Butadiene's plans—Fish now proposes to make 45,000 tons/year of "all the types" of rubber used in Argentina—including the SBR type. Fish maintains its plant could produce SBR cheaper than Texas Butadiene's, wants the government to approve both plants and let them compete for Argentina's limited market. Texas asserts this proposal violates terms of Fish's decree.

Fish's new bid will almost certainly fail. The government expects to approve both projects soon—under the original terms.

## COMPANIES

**Bzura Chemical Co.** (Keyport, N.J.)—the country's newest producer of citric acid—is seeking Securities & Exchange Commission registration for a public offering of 450,000 shares of common stock. Proceeds—estimated at \$2.85 million—will be used to expand fumaric acid capacity and to provide facilities for production of itaconic acid and other fermentation products. Also, Bzura Chemical is about to issue 2.1 million shares of stock for acquisition of its parent company, Bzura, Inc. (*CW*, Aug. 20, p. 26).

**National Gypsum Co.** (Buffalo) will acquire the Allentown (Pa.) Portland Cement Co. through an exchange of stock valued at \$30 million. NG will exchange one-half share of its common stock for each share of Allentown common. The acquisition will boost NG's capacity by 4.5 million bbls./year. National Gypsum is also expected to acquire another—as yet unnamed—construction materials producer through a \$20-million stock exchange.

**Nixon-Baldwin Chemicals** (Nixon, N.J.), manufacturer of rigid thermoplastic sheeting, rods, tubes, and other forms, is seeking Security & Exchange Commission registration for sale of \$4 million worth of 6½% subordinated debentures (due Oct. 1, 1980) and 160,000 shares of common stock. Proceeds will be used to help clear debts incurred in last June's purchase of Nixon Nitration Works.

**Olin Mathieson Ship Financing Corp.** (New York) has obtained Securities & Exchange Commission clearance to lend Olin Mathieson Shipping Corp. \$9.5 million—to be obtained by selling bonds to Prudential Insurance Co.—for construction of a combination cargo ship. This will be one of several vessels for shipment of African alumina to Ormet Corp. (Omaha, O.)—jointly owned by Olin Mathieson Chemical and Revere Copper and Brass—and to various European aluminum producers. OM and those European producers are co-owners of FRIA, the Guinean bauxite mining company that will supply the alumina.

## EXPANSION

**Cement:** Kaiser-Permanente Cement Co. (Oakland, Calif.) will construct a \$5-million cement manufacturing plant either at Anchorage, Alaska, or at Sutton, 66 miles from Anchorage. The plant, scheduled for construction in '62, will feature a new European-type kiln with capacity of 500,000 bbls./year. Choice lies between availability of natural gas at Anchorage, and 240 acres of high-grade limestone and a producing coal mine at Sutton.

**Silica:** National Silica Co. (Oregon, Ill.) is building

a \$500,000 silica plant four miles south of Guion, Ark. The new plant—to be built on an 800-acre site containing an estimated 500 million tons of silica assayed at 99.9%—will produce 120 tons/hour of silica. It will process silica for the glass industry and foundries, fracturing sand for the oil industry. Onstream date: Sept. 15.

**Chemical Coke:** Peabody-Wright Corp., subsidiary of Peabody Coal Co. (Chicago), will build a chemical coke plant at Columbia, Tenn. The plant—scheduled for operation by Jan. 1—will supply several chemical plants in the Columbia area, including Hooker Chemical's Phosphorus Division, which uses chemical coke to produce elemental phosphorus. Construction costs: "below \$5 million."

**Textile Chemicals:** W. F. Fancourt Co. (Philadelphia), textile chemical manufacturer, will construct a plant on a 10-acre tract recently purchased at Greensboro, N.C. Completion date: next summer. The three-story brick building will include a research and development laboratory. The new plant's manufacturing unit will double the company's present capacity.

## FOREIGN

**Resins/Uruguay:** Reichhold Chemicals (White Plains, N.Y.) has signed a license agreement with Compania BAO, S.A. (Montevideo) to manufacture resins for use in adhesives, bonding and polyesters. BAO will market these resins in Uruguay under RCI's trade marks. Cost of plant equipment (other costs are as yet undetermined): \$100,000.

**Synthetic Urea/Portugal:** Montecatini has signed an agreement with Uniao Fabril do Azoto (Lisbon) to build a plant at Lavradio, Portugal, to produce synthetic urea by the Fauser-Montecatini process. The plant—Montecatini's 34th for urea synthesis through its F-M process—will have a capacity of 40,000 tons of granulated urea/year.

**Investment/Taiwan:** American Cyanamid's recent investment in Taiwan (*CW*, Aug. 13, p. 18) apparently has given impetus to local legislation designed to spur private—including U.S.—investment. A new investment incentives law is scheduled to be passed by the legislature this week. The law will provide for sale of agricultural land for industrial use, foreign exchange controls and remittances of profits, and the sale of government-owned enterprises to private holdings.

**Maleic Anhydride/Japan:** Miike Gosei Chemical Industry Co. (Ohmuta City, Kyushu) will build a maleic anhydride plant using the Scientific Design process of fixed-bed, catalytic, air oxidation of benzene. Plant capacity: 8 million lbs./year.



Versatile new high-boiling solvents help improve spray coatings.

## Shooting for Solvent Sales

Two new solvents are seeking acceptance on the strength of their ability to simplify the formulation of acrylic, nitrocellulose and vinyl coatings. Shell Chemical Corp. (New York) has developed the new compounds (*CW Technology Newsletter*, Sept. 3), which appear to have solvency for a wide range of resins, enabling paintmakers to make substantial cuts in their solvents inventory.

The new solvents are (1) a keto-ether called Pent-Oxone and (2) a glycol-ether Pent-Oxol. Addition of these new compounds to its line gives Shell four types of high-boiling (slow evaporating) solvents. (The company also offers two other high-boiling materials: diacetone alcohol and ethyl amyl ketone.) The high-boiling solvents (those with boiling point above 140 C) are, generally, high-molecular-weight materials, used in coatings—such as those used on furniture and autos—where “blush” resistance and good flow properties are desired.

About 20 of these solvents are used in the U.S. at present; they

generally command a higher price than lower-boiling solvents; and in conventional practice they're used in combination with fast- and medium-evaporating solvents.

About 10% of the solvent used in a nitrocellulose lacquer would be made up of the higher-boiling types. For acrylic coatings the percentage of higher-boiling-point solvents would run somewhat higher.

The importance of getting the proper solvent system is obvious: around 80% of a coating consists of the various solvents and/or diluents.

**Wide-Range Use:** Of the new solvents, Pent-Oxone (4-methoxy-4-methyl pentanone-2) is widest in its solvency range. According to Shell, it has solvency for nitrocellulose, vinyl, acrylic, epoxy and urethane resins. This is an exceptionally wide range of solvency for a long-chain solvent.

Such a range would give Shell some heavy sales ammunition with which to approach formulator. For instance the formulator who is using a solvent such as Cellosolve acetate for acrylics, butyl Cellosolve for nitrocel-

lulose and either isophorone or cyclohexanone for vinyls, might be able to use Pent-Oxone as a substitute for any or all of these.

This claim as a multi-use solvent however, could also be made for such solvents as methyl amyl acetate, butyl Cellosolve and a number of other high-boiling materials.

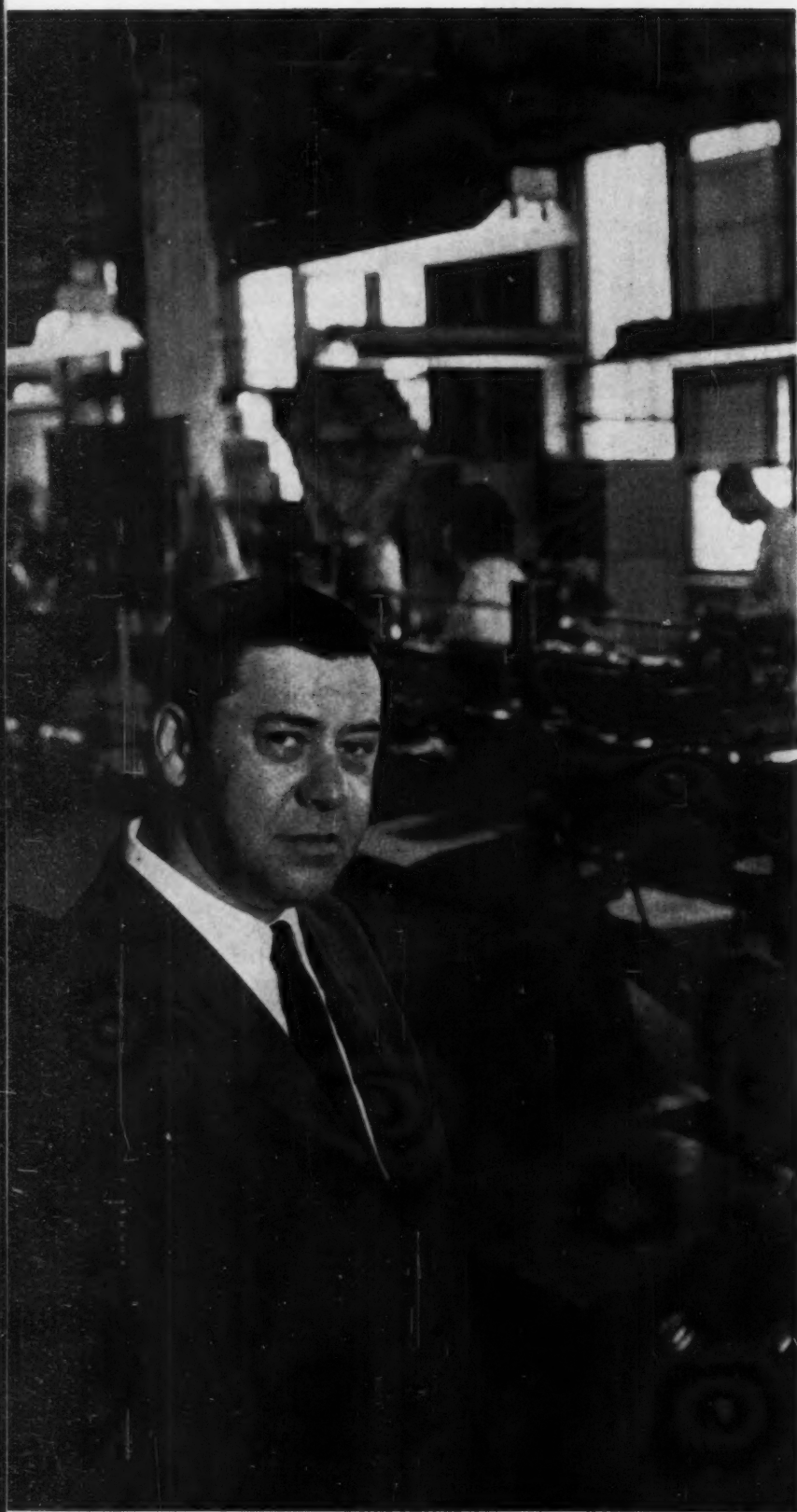
Pent-Oxone is chemically a derivative of diacetone alcohol, another Shell product; it's a water-white liquid and has a boiling range of 147-163 C. One of the drawbacks of diacetone alcohol is its tendency to give some trouble in color formation by reverting back to acetone, but apparently, by substituting a methyl group for hydrogen, Shell has been able to stabilize the molecule.

**Pent-Oxol:** While Pent-Oxol, the glycol-ether solvent doesn't have the wide range of solvency reputed for Pent-Oxone, Shell's looking for it to find considerable application in non-coating uses. As a solvent the compound (4-methoxy-4-methyl pentanol-2) appears to have promise for use with acrylic, nitrocellulose and vinyl (though some trade sources doubt this latter claim). It's a higher-boiling (slower evaporating solvent than Pent-Oxone, has a boiling-point range from 163.8 to 167 C. Its evaporation rate closely resembles that of 2-ethoxyethyl acetate (it's somewhat slower), while Pent-Oxone's is close to that of ethyl amyl ketone.

One of the big selling points of Pent-Oxol may prove to be its high toluene dilution ratio of 4.6 (Pent-Oxone's is around 3.0). This allows paintmakers to use the lower-cost material in considerable quantity, consequently cutting down on over-all costs.

Though Shell describes the new materials as “competitive” with other high boilers (Pent-Oxone sells for 17½¢/lb. and Pent-Oxol for 19¢/lb. in bulk), their respective \$1.32 and \$1.41/gal. costs appears to make them premium price items.

**Paintmakers Gain:** Introduction of the two new solvents, along with Union Carbide's recent reduction in costs of its high-boiling solvent methyl isoamyl ketone from 31¢ to 17½¢/lb. should provide paintmakers a wider range of solvents with which to formulate products in the future.



## Hair Spray

The \$125-million hair spray industry is closely watching a Minneapolis court case this week and figuratively keeping its fingers crossed. Reason: outcome of the La Maur-Donaldson case, currently being tried over La Maur's patent rights to polyvinyl pyrrolidone and a copolymer of PVP in hair sprays, could bring sweeping changes to the business.

Besides manufacturers of the aerosol sprays, others could also be affected by the decision, including custom fillers, and producers of PVP and other resins for hair sprays.

**The Contestants:** La Maur, Inc. (Minneapolis), maker of hair sprays and other supplies mainly for beauty salons—and recipient of a patent on use of PVP\* in hair spray, is the plaintiff in the case. It is suing L. S. Donaldson Co., a Minneapolis department store that was selling Max Factor's Sof-Set Curl Control a product La Maur claims infringed upon its patent.

Donaldson, however, is more or less an innocent party. In reality, La-Maur's main opposition (and co-defendant with Donaldson) is G. Barr & Co. (Chicago), contract aerosol filler with a large volume of business in packaging hair sprays. Barr, which is Max Factor's filler, is "holding harmless" Factor and its other hair spray customers by assuming responsibility for damages in the event the case goes in La Maur's favor.

**Crux Is Copolymer:** For years it was generally believed by the industry that a PVP hair spray formulation was not patentable. But La Maur, which had brought out the first PVP spray, Style, in '52, applied for a patent the same year and finally received it in Jan. '59.

The patent's claims covered more than PVP, according to Maurice Spiegel, president of La Maur and owner of the patent, who has maintained it includes rights to certain copolymers, particularly vinyl pyrroli-

\*Technically, the patent describes a "sprayable water-free alcoholic polyvinyl pyrrolidone hair preparation" combined with a fluorinated hydrocarbon propellant.

G. Barr's George Barr fights PVP patent as industry awaits outcome.

# Makers Near Court Showdown

done/vinyl acetate (70% VP/30% VA).

This point was quickly disputed by the rest of the industry, which argued that Spiegel's patent was extremely vague on this point. And both G. Barr and General Aniline & Film Corp. (New York) had already applied for their own patents on the use of the copolymer in a hair spray.

Probably the most important question that the trial now under way will decide is whether Spiegel's patent covers a copolymer-containing hair spray. For today, few straight PVP hair sprays are on the market. A great many spray formulations, including Factor's Sof-Set, use the copolymer.

**Hectic History:** In the spring of '59 La Maur offered to license other marketers of PVP or VP/VA sprays. Royalties were set at 1/2¢ for 8- to 16-oz. cans, 3/4¢ for 4-8-oz. cans, and 1/4¢ for cans under 4 oz. With few exceptions, La Maur found the hair spray industry not interested in licensing. Gene Rose Co., a Chicago aerosol filler, took a license for a short time and dropped it. Breck, one of the top manufacturers, which sells a PVP formulation, is known to be a licensee and La Maur says several others are paying royalties also.

Shortly after La Maur's patent was granted Barr considered paying royalties to the Minneapolis firm. According to Barr, it decided against paying—for several reasons. At that time it was filling only a small quantity of PVP sprays and production of this type soon stopped altogether. Besides, Barr felt that its packaging volume was not big enough for it to become involved in a licensing arrangement. Also, it felt the patent did not cover the VP/VA copolymer.

The company assured its customers that they had nothing to worry about, and that it would be responsible should La Maur sue for damages.

A few months later La Maur brought suit on two counts—patent infringement and misappropriation of a trade secret. (The companies have not always been at odds, though. In '52 Barr filled the initial runs for La Maur's PVP spray; the company now has packaging facilities of its own.)

**Play It Safe:** Barr's position of

holding his customers "harmless" is a unique stand. Most other aerosol fillers, while watching the dispute with avid interest, have not offered to do the same for their hair spray customers. Main reason is that their business is not so heavily concentrated in hair sprays as is Barr's.

Aerosol Techniques Inc. (Bridgeport, Conn.) which is packaging both PVP and VP/VA sprays, says it will assume responsibility for any suits brought against its VP/VA spray customers.

**Three Results Possible:** The hearing, scheduled to begin Sept. 6, could have three possible denouements. La Maur may win, Barr-Donaldson may win, or the patent may be declared invalid and the case thrown out. The hair spray industry is betting on—and hoping for—the latter.

If La Maur wins its case on all counts, including the claim to the copolymer, it means Barr must pay damages for all PVP and VP/VA hair sprays that it has turned out since Jan. '59. This would add up to a tidy sum for La Maur. But the decision will directly affect only Barr and its customers. La Maur would have to sue individually other marketers who are not paying royalties.

On the other hand, if Barr wins because the court decides the patent does not cover the copolymer, it will mean Barr's customers and probably the whole industry can breathe easily.

If the patent is declared invalid, it means Barr and the industry are home free.

If La Maur wins, not all is lost for hair spray makers. There are half a dozen similar resins on the market from which to choose; and others in the experimental stage.

It's also reported that if La Maur wins, some marketers, who don't wish to take a chance on getting involved in patent infringement suits, are thinking of changing their PVP formulations.

**Most Popular Aerosol:** Hair sprays continue to be the biggest-selling aerosol product in terms of units. The trend, steadily upward in sales and production, was arrested slightly in '59 when 100 million units were turned out. But in '60, an estimated 112 mil-

lion cans are expected to be produced—worth \$159 million in retail sales. By '63, it's forecast, there will be 120 million hair sprays in a \$170-million market.

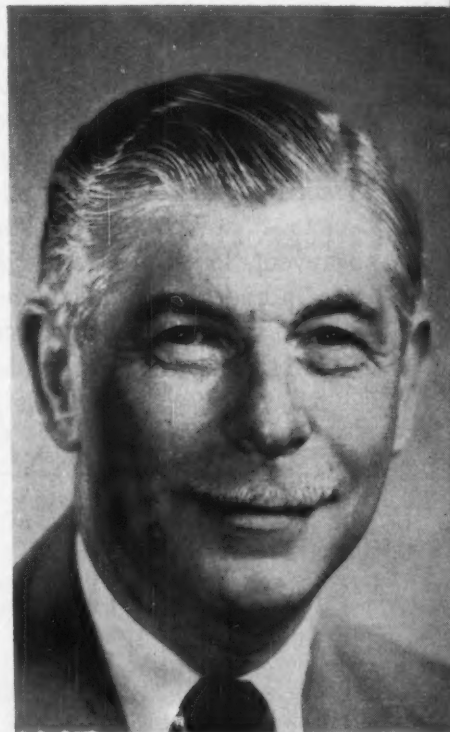
About 45 companies market hair sprays, many of them private label. Among the companies marketing top-selling national brands are Revlon, Helene Curtis, Colgate, Breck, Toni.

The first aerosol hair lacquer, Liquinet, made by Liquinet Corp. (Chicago), appeared in '49. Early products were shellac-type formulations.

Since that time many variations—e.g., formulations for different types of hair, men's hair sprays, hair colorants—have been introduced and new resins have been developed.

Ciba is offering a modified acrylic resin, Base 325, which is a neutralized copolymer of a polyacrylic acid ester, while National Starch & Chemical Corp. has available a vinyl acetate copolymer, Resyn 28-1310. Hoffmann-

La Maur's Spiegel battles to prove his patent covers PVP copolymer.



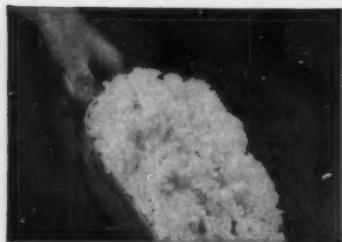
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## SPECIALTIES

La Roche Inc.'s Panthenol can be used alone for a soft set, or combined with a resin for a firmer set. Dimethyl hydantoin formaldehyde is also being used, and shellacs, whose popularity dropped off, are said to be making a comeback.

**PVP Has Competition:** General Aniline & Film Corp. did much of the developmental work on PVP in aerosol hair sprays. The German patent on PVP was seized by the alien property custodian during the war and was licensed to GAF, among others. However, GAF itself owned the patents directed to Reppe chemistry preparation of PVP intermediates. Today, it remains the sole producer of the material in the U.S., a market amounting to 500,000 to 1 million lbs./year. Sales of \$625,000 to \$1.25 million/-year do not add up to a tremendous market but still worthwhile for one company.

However, if La Maur wins and the hair spray industry decides to drop PVP and VP/VA, GAF stands to lose heavily.

Also, recently developed materials are threatening to undercut PVP use. The Dow Chemical Co. (Midland, Mich.) introduced two new polymers a few weeks ago with which it hopes to make significant inroads into PVP's market. Devlex A515 is a copolymer of vinyl methyl oxazolidinone and vinyl acetate; Devlex 130, a grade of polyvinyl methyl oxazolidinone. Prices are said to be competitive with PVP. And Texas Butadiene (New York) has been working on a styrene maleic anhydride copolymer that may have application in hair sprays.

Regardless of who wins the La Maur-Donaldson test case, it will settle some questions which have plagued the industry for years.

## Boost for Silicones

If a drycleaning machine, soon to be introduced into North American markets, lives up to its advance publicity, makers of silicone fabric treatments may enjoy a substantial market increase. A French-developed drycleaning unit, called the Silvimatic, combines drycleaning with silicone finishing of clothes. Heretofore, most silicones have been put on fabrics before they're made into garments. Successful debut of the Silvimatic, or others like it, would create a new



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Chemical Materials Catalog  
Page 199 for further data.



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**WALLACE & TIERNAN INCORPORATED**  
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## SPECIALTIES

market for silicones to neighborhood cleaners.

A Canadian company, Silvimatec Commonwealth Corp. (Montreal), has been organized to introduce and sell the machine. The unit holds interest for more than just makers of textile silicones, since it uses no filters, solvent recovery apparatus, or vacuum still. It is also said to eliminate the need for most prespotting and/or charged baths.

## Bottled-Tan Battle

A battle in the booming bottled-tan business is shaping up over recent patents. Drug Research Corp. (New York), maker of the first synthetic tanner to hit the market (Man-Tan), and Wallerstein Laboratories, initial producer of chemical tanning agent, dihydroxyacetone, are prime contestants in the battle.

The patents are certain to have some effect on the cosmetics market, which has retail sales of \$10 million to \$70 million/year. Drug Research, which launched Man-Tan in '59, now sells three companion items as well—Miss Mantan, a foundation cream for women; and Positan and Tan Perfect, sun tan lotions that are made with a sun-screening agent. Its patent (2,949,403) contains eight claims, covers all no-sun tanners using DHA as main ingredient. DHA, a fermentation product of glycerol, wasn't used commercially prior to bottled tanners.

DR's first move after receiving its patent was to sue some of its biggest competitors (DR says some are imitators) for patent infringement and, in some cases, unfair competition. The companies include: Coppertone Corp. and Plough, Inc. (Q-T); Tan-O-Rama, Inc. (Tan-O-Rama); Rolley Co. and Botany Industries Inc. (Tansation); Ed Pinaud, Inc. and Nestle-Lemur, Inc. (Rapid-Tan); Chemway Corp. (Tan-O-Tan); Leonet Corp. (Magic Tan); and Procapa Products (Pro-Tan).

Several dozen smaller outfits are also manufacturing or distributing similar products, but DR hasn't pressed them yet.

Harry B. Solmson, executive vice-president of Plough, Inc., told **CHEMICAL WEEK**, "We do not feel there is any valid patent position that prevents our selling our Q-T product. We feel that we have certain prior

inventive rights. We are taking necessary legal steps to establish our position and are continuing to advertise and sell Q-T."

And President Abe Plough adds, "We have no concern over the suit, though they (Drug Research) are making a big thing of it."

William B. Randall, general manager of Rolley Co., declined to comment on what steps his company will take.

Drug Research, now in the process of setting up a worldwide distribution system, says it has applied for patents abroad also. So far, Canada and Belgium have issued patents to DR.

On the raw-materials side of the picture, Wallerstein Labs was granted a patent on its process for making DHA about a month ago (*CW*, Aug. 20, p. 94). Three competing producers, Dawes, Pfizer and Abbott, may be affected by that patent but, so far, no action has been taken by either side.

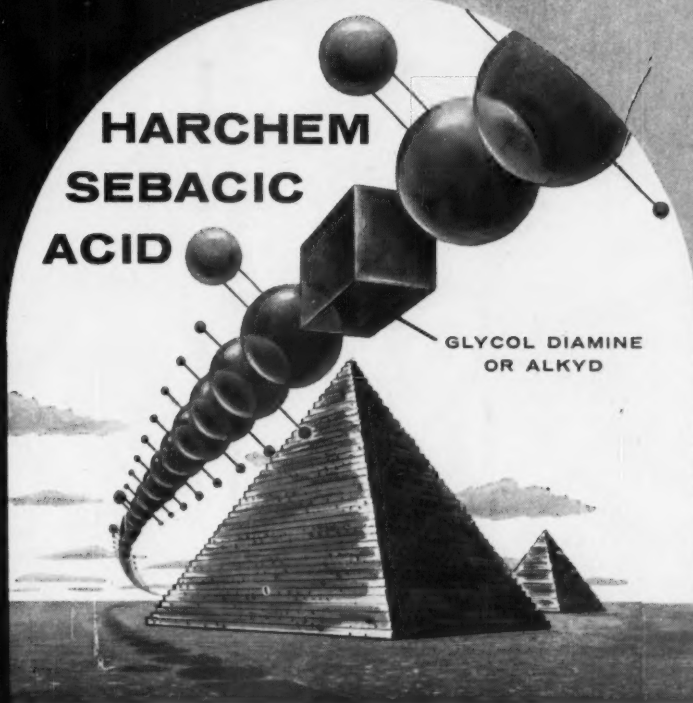
## PRODUCTS

**Lubricity Stabilizer:** Fine Organics, Inc. (205 Main St., Lodi, N.J.), has made available its W.S.G. lubricity stabilizer to extend the life of water-soluble cutting oils and to eliminate odor and spoilage. It is suggested for Blanchard and Centerless grinders, turret and bench lathes. It's said to be noncorrosive, nontoxic and stable, is being sold in 1-gal. bottles and 5- and 55-gal. drums.

**Leveling Agent:** Shanco Plastics and Chemicals Inc. (Tonawanda, N.Y.) has developed a new leveling agent, Shanco L-1159, for polymer emulsion polishes. It is said to produce a clear, brilliant film when used with acrylic emulsions, and resultant films are resistant to water spotting. The product is described as a pale, high-melting, alkali-soluble resin.

**Stops Spud Sprouts:** Columbia-Southern Chemical Corp. (Pittsburgh, Pa.) this fall will market a new potato sprout inhibitor that is said to be a permanent low-cost treatment for stored potatoes. Sprout Nip, applied to potatoes as an aerosol, is suspended in the air circulating through potatoes stored in bulk or pallet boxes. The product contains isopropyl N-3-chlorophenyl carbamate.

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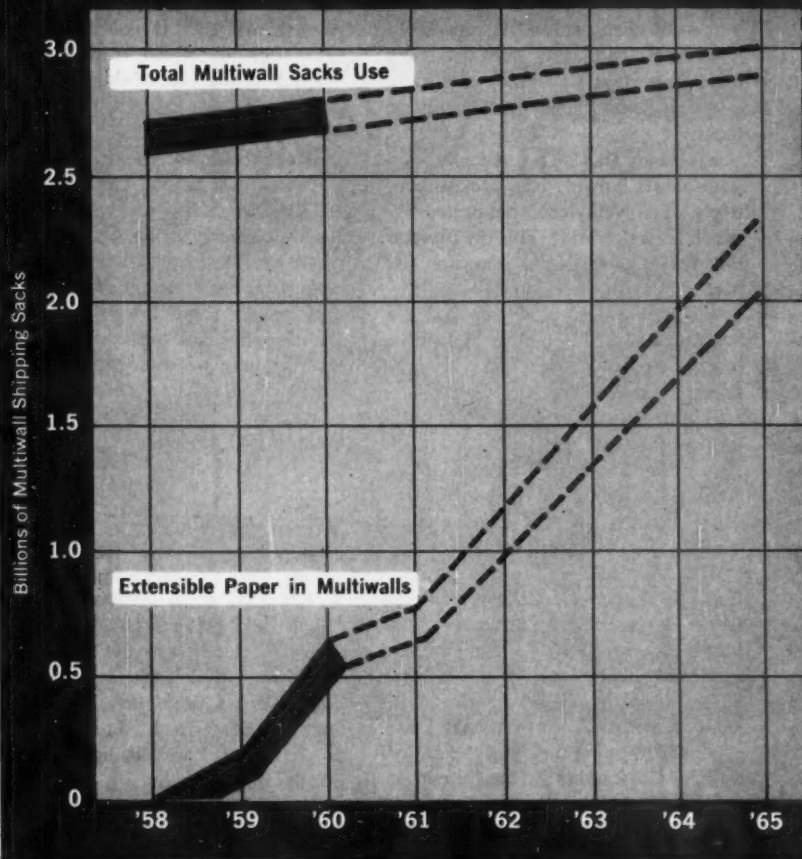
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### Extensible Paper: Growing Bite of the Multiwall Market



## 'Stretch' Paper Crimps Kraft Multiwall Lead

Ordinary kraft paper, long the mainstay of the paper multiwall shipping sack business, is finding the competition keener than ever. A host of new materials, led by stretchable paper, is bidding for a chunk of the big market for shipping sacks in the chemical process industries. For chemical shippers, these new materials are revolutionizing the multiwall business, offering ever-higher bag performance standards and attracting new kinds of chemical products into bag shipments.

Latest available figures (see chart, above) show that after just two years on the market, extensible kraft paper has mounted a formidable attack on markets long dominated by conventional kraft, has begun to take a

substantial portion of the business.

**Extensibles' Push:** Virtually all extensible paper now being produced is Clupak, made by a patented process owned and licensed by New York-based Clupak, Inc. (jointly owned by West Virginia Pulp & Paper and Cluett-Peabody, Inc.). Scott Paper Co. (Chester, Pa.) produces a similar material called Expandakraft, but is now tangled with Clupak, Inc., in a legal battle over the process.

Clupak, Inc., reports that over 15% of all multiwalls produced in the U.S. are made of its extensible paper. Actually, some observers figure they have even more of the market—some 53 million bags/month, which accounts for nearly 23% of all multiwalls made. What's more, Clupak pre-

dicts that its extensible paper will be used in 75% of all multiwalls by '65.

But oddly enough, some top chemical companies differ widely on the merits of extensible paper. Proponents point out that the greater strength inherent in extensible paper allows them to cut loss and damage claims sharply. And, they add, often one ply of a 4-, 5- or 6-ply bag can be eliminated because of the paper's strength and puncture resistance. In other instances, chemical shippers can use thinner paper. On a weight basis, extensible paper costs about 5-7% more than conventional kraft, but bags made of it usually cost less because shippers use fewer plies and thinner paper.

One large shipper told CHEMICAL

**Where Multiwalls Are Used**

	'58	'59
Chemicals, drugs	36%	38%
Agricultural, food	35%	32%
Building materials	19%	20%
Minerals	8%	8%
Miscellaneous	2%	2%

WEEK it now uses extensible paper for 65-70% of its paper shipping sack needs. Another large CPI firm reports that it expects to make a complete changeover to extensible paper sacks within two years.

**Braking the Rise:** But not all chemical shippers feel this way about extensible paper sacks. They see the higher price as a real deterrent to more widespread use of the paper. In some companies, extensible paper has found applications only where damage losses have been unusually high. These firms report they've managed to cut these losses with the stretch paper; still, they move slowly in adopting it for other bag uses. Their reason: "Why spend more for a bag when you're doing all right with the one you've got?"

Another large chemical shipper notes that extensible paper is spongy, tends to pick up moisture readily.

Paper and bag producers are not entirely pleased with the new paper, either. It's no secret that many of them dislike the easy stretch of the paper, which makes it more difficult to handle without sagging. And extensive development work has been needed to coat various plastic materials over extensible paper.

Still, many observers who aren't enthusiastic about extensible paper believe it represents only the first of a series of improvements in the strength and durability of paper for shipping sacks.

**Moisture Barriers:** More paper shipping sacks now embody moisture barriers of one kind or another—some 25%—than perhaps at any previous time. Here, as with outer bag wall components, the traditional mainstay—asphalt laminated sheet—is under heavy pressure from newer materials. Besides conventional high density polyethylene, polyethylenes of

medium and low density as well as numerous other resins and copolymers are finding uses as extrusion-coatings over kraft paper to provide moisture barriers.

Bag constructions are undergoing numerous changes, too. Among them:

- Pasted-end sacks are becoming more important since they are more easily palletized than are sewn-end sacks.

- Chase Bag Co. recently announced its Poly-ply bag, consisting of a ply of polyethylene spot-pasted between layers of kraft. This ply protects the polyethylene from abrasion by hard, sharp materials such as salt.

- An all-polyethylene bag inside a kraft sack is getting a close look from several bag producers and chemical shippers hoping to get maximum moisture protection at minimum cost.

The 5-10-mil plastic sack (*CW*, Feb. 20, p. 35) is still under development. Heat seal and cost problems still figure to hold this bag down to specialty uses for now. Examples:

- St. Regis Paper Co. says its new, Capcote poly-coated kraft outperforms conventional extrusion-coated krafts as a barrier.

Meanwhile, outlook for the over-all multiwall business is mixed. Based on '60 production of conventional kraft paper for shipping sack use, the multiwall business seems brisk. Output of this paper in the first half topped 500,000 tons, is headed for a record 1 million tons/year. Production last year totaled 891,000 tons.

But market observers caution that business is not so rosy for multiwall producers. Most packaging men figure '60 multiwall production will reach 2.75 billion bags, essentially the same as in '59. It's possible, they say, that bag production could fall short of '59's total by some 2-3%. One reason: slow pace of building construction, causing reduced cement shipments.

One bright spot in the multiwall picture is consumption by the chemical process industries. Chemical and drug uses took 38% of all sacks made in '59, up 2% from '58 (see chart, above). And mineral and building products took a substantial share, boosting over-all CPI use to an estimated 45% of all multiwalls made last year.

Increasing dependence on bulk shipping methods has hurt multiwall use in the CPI. But packaging men

feel that the addition of new chemical products (which often are packaged in multiwalls, at least when first introduced) and over-all growth of the business have reduced the impact somewhat. And they note that in many cases it's difficult to package for less than 0.1¢/lb., which is usually considered as the rule-of-thumb for bag costs, even using current high-volume, bulk shipping methods.

**Looking Ahead:** In any event, the lively struggle among competing materials for sacks—and among sack types—appears to be aimed exactly where chemical packaging men would have it: in the direction of higher bag performance and lower bag costs. The shipping sack business apparently provides one of those rare but welcome situations for chemical packaging men in which they have almost nothing to lose, and a great deal to gain.

**Piggyback Tank Trucks**

Last week's okay given to Chicago & North Western Railway to carry "piggyback" highway tank trucks filled with hazardous chemicals may be the first of several such authorizations (*CW Market Newsletter*, Sept. 3). At least one other road, Maine's Bangor & Aroostock Railroad, has been testing the plan also.

In any case, it will be some time before chemical producers can take advantage of the new transport system, since rates and schedules have not been worked out. Testing of the system, in fact, has just been wound up. During May, June and July of this year, C&NW ran test loads between Chicago and St. Louis, first using tankers filled with water, then with sulfuric acid.

According to the Assn. of American Railroads' Bureau of Explosives, helping the Interstate Commerce Commission on this program, the tests proved that tank trucks could be firmly attached to rail flatcars; that the tankers and auxiliary equipment (such as pressure relief devices) will be satisfactory for such uses.

Severest of the tests imposed on the piggyback shipments were rapid stops made by fast-moving freight trains. During such stops, rail equipment and lading undergo severe jolting usually expected when highway tank trailers are used.



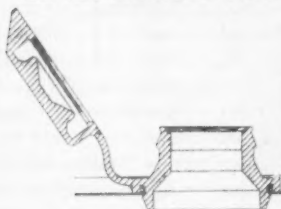
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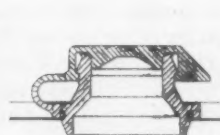
Continental presents new packaging beauty with economy and convenience, too... Flip Cap\* can, with dripless pour spout, is perfect for practically all liquids and granulated products now packaged in round or oblong nozzle-type cans.

Continental's new plastic Flip Cap is permanently hinged to its dripless pour spout—snaps back and stays open, snaps shut and stays shut. Inserted into the top of the can *after* filling, Flip Cap permits higher filling speeds through a larger opening. And the top of the

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\*Patents pending



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As a result of the tests, however, the bureau feels that most highway tank trucks should prove adequate for piggyback hauls.

**Economic Puzzle:** Although this technical hurdle has largely been cleared, the big unanswered question remains: Where will piggyback tank-truck service prove most useful to chemical shippers?

**Consensus:** piggyback tank-truck moves likely will extend the operating radiuses of many tank truckers and for the most part will involve very-high-volume commodities—e.g., sulfuric acid, caustic soda, alcohols. Reasons: chances of getting a return haul would be greater, and cleaning would not pose many of the problems created by harder-to-handle materials.

Traffic men agree that piggyback shipments involving Plan 1 (railroads carrying regular common-carrier tank trucks) and Plan 3 (carriage of shipper-owned trucks) seem most promising.

## Linde Shifts Lines

The Linde Co., division of Union Carbide Corp., is this week putting final touches on a plan to shift into broader production of cryogenic equipment. At the same time, it is trimming its output of conventional gas cylinders.

By the end of this month, Linde will terminate production and sale of gas cylinders for liquefied petroleum gas, refrigerant gases and anhydrous ammonia. These containers had been produced both for captive use and for sale to other companies.

Linde has sold for an undisclosed sum its manufacturing equipment and relevant technology to Cylinders, Inc., an affiliate of the Newark Steel Drum Co. (Linden, N.J.). Customers are scheduled to start receiving cylinders from the new maker's Linden plant in Feb. '61.

Reason for the move, according to Linde, is its desire to broaden and deepen its production of cylinders and gas converters for handling cryogenic materials.

**Early Product Line:** For Linde, the move will effectively close out a line of products predating the formation of the Union Carbide Corp. in 1917. At that time, the Prest-O-Lite Co., Inc.—one of the several companies

that merged to form Union Carbide & Carbon Corp.—produced various kinds of gas cylinders as an outgrowth of its original work in making and selling highly specialized cylinders for acetylene (which it will continue to manufacture).

Principal items of cryogenic equipment to be produced include liquid nitrogen-cooled refrigerators, oxygen converters for high-altitude aircraft.

## DATA DIGEST

- **Acetone:** New data sheet outlines the properties, specifications and uses for acetone made by cumene oxidation. Hercules Powder Co. (Wilmington 99, Del.).

- **High-Purity Halides:** Catalog describes company's line of high purity fluorides, iodides and bromides. American Fluoride Corp. (415 Lexington Ave. New York 17).

- **Company Products:** Bulletin presents the formulas, properties and uses of 88 commercially-produced products as well as six development chemicals. Over 20 of the products listed are relatively new to the line. Among those listed: acids, alkalies, sulfur compounds, chlorides, phosphorus materials, metallic salts and chlorobenzenes. Hooker Chemical Co. (P.O. Box 344, Niagara Falls, N.Y.).

- **PVC Plasticizers:** Booklet (MR-20-60) outlines the physical and performance properties of monomeric and polymeric plasticizers for polyvinyl chloride products. Rohm & Haas Co. (Washington Square, Philadelphia 4, Pa.).

- **Minerals:** New eight-page catalog (# 1004) outlines properties and uses of various mineral products derived from aluminum silicate, activated bauxite, attapulgus clay and limestone. Minerals & Chemicals Philippon (Menlo Park, N.J.).

- **Molten Maleic Anhydride:** New, 12-page booklet details the economic and technical reasons for receiving and handling maleic anhydride in molten form. Charts and tables describe investment and amortization data as well as storage systems for the material. National Aniline Division, Allied Chemical Corp. (New York).

- **Titanium Tetrachloride:** New, 16-page brochure outlines the properties, handling precautions and typical analysis of titanium tetrachloride.

Columbia-Southern Chemical Corp. (632 Fort Duquesne Blvd., Pittsburgh, Pa.).

- **Amides:** Booklet describes properties and uses of high-molecular-weight amides derived from fatty acids. These waxlike materials are straight-chain molecules with melting points in the 68 to 104 F range. Typical uses: coatings, rubbers, detergents, water repellants, inks and emulsions. Armour Industrial Chemical Co., division of Armour & Co. (110 North Wacker Dr., Chicago 6).

- **Methanol:** New, 32-page booklet presents data on properties and uses of synthetic methanol. Tables provide detailed property and specification data; charts illustrate relationships. Also included: sections on toxicity and health hazards, determination of methanol vapors in air, specification test methods and storage and handling recommendations. Industrial Chemical Dept., Commercial Solvents Corp. (260 Madison Ave., New York).

- **Ion-Exchange Paper:** Folder and price list give data on grades, prices and uses of ion-exchange paper for use in analytical separations, industrial purification operations and as a medical diagnostic tool. Rohm & Haas Co. (Washington Square, Philadelphia 5).

- **Epoxides:** Bulletin furnishes property and use data on olefin and terpene oxides as reactive diluents for epoxy resin formulations. Epoxy Dept., Chemicals & Plastics Division, Food Machinery and Chemical Corp. (New York).

- **Ultrapure Gold:** Data sheet highlights available forms of ultrapure gold. Firm offers material in purities to 99.999% in powder, foil, strip or bar. High Purity Metals, Inc. (340 Hudson St., Hackensack, N. J.).

- **Styrene-Butadiene Latexes:** Data sheet lists some of the specifications, properties obtainable and available forms of styrene-butadiene latex materials. Chemical Division, International Latex Corp. (Dover, Del.).

- **Acetonitrile:** New, 56-page ring-bound book gives data on reactions, physical properties, uses and over 130 literature references for acetonitrile. Typical uses: metal deactivation, solvent jobs of many types, dyes, anti-static agents, pharmaceuticals and detergents. Sohio Chemical Co. (Lima, O.).

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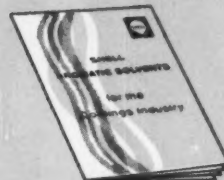
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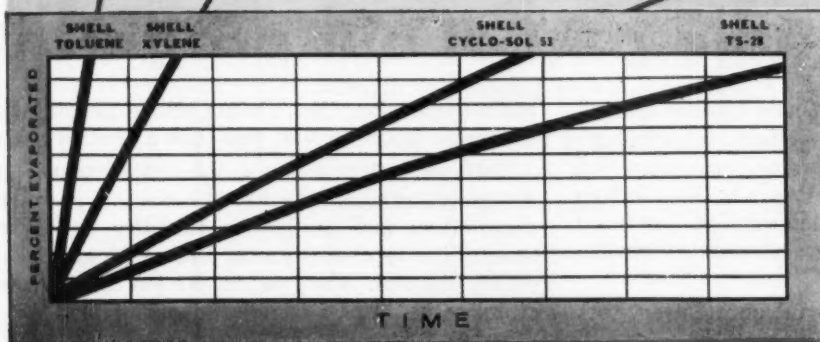
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# Washington Newsletter

CHEMICAL WEEK

September 10, 1960

**The military is buying foreign drugs at enormous savings**—to the dismay and anger of the U.S. pharmaceutical industry. The drug makers have pressured the State Dept., Comptroller General, Secretary of the Navy and some congressmen to stop the practice, so far in vain (*see also CW Viewpoint, July 23*).

This is the story the Kefauver investigating committee is expected to bring out this week. The witness: Rear Adm. W. L. Knickerbocker, Executive Director of the Military Medical Supply Agency.

In the past seven months the agency made five big drug purchases from Italian firms for a total \$1,732,131—a savings of 53%. The military says it is buying foreign drugs only where domestic ones are overpriced. On “reasonably priced” drugs, it says, foreign firms are not trying to compete.

The drugs are tested by the Food & Drug Administration for quality. U.S. military inspectors have even gone to the Italian plants to watch over production and insure adequate controls. Quality of foreign products is attested, says Knickerbocker, by the fact that leading American drug suppliers procure raw material from foreign sources. As to safety, in purchases of meprobamate (Miltown and Equanil), the military requires batch-by-batch quality tests by FDA—a safeguard it cannot legally impose on domestic producers.

Knickerbocker says the military started seeking foreign bids only after finding that only one domestic source would be willing to supply a particular item, or that “amazingly, time and time again” competitors submitted identical low bids.

One key industry rebuttal: “Sure, but the Italians are parasites on the pharmaceutical discoveries of others. They have no patent protection and have not produced a single important new drug. If they had our research costs, they couldn’t undersell us.”

The Italians may not be the only suppliers in the future, however. The military is looking at such other companies as Lepetit-Ledoga; Rhone Poulenc, Imperial Chemical Industries, and Geigy.

•  
**Distribution of the new oral polio vaccine** may trigger a fight between the medical profession and the government. U.S. Surgeon General Leroy Burney is calling a meeting sometime this fall among public health officials, pharmaceutical manufacturers, pharmacists and the American Medical Assn. to consider the problem.

Burney will want programs of mass immunization on a community-by-community basis when the vaccine becomes available late in 1961 (*CW, Sept. 3, p. 23*). A Public Health Service committee made this recommendation because the live virus vaccine has the ability to spread

## Washington Newsletter

(Continued)

immunization even to those who do not receive treatment. This has both benefit and danger: immunization is widened, but authorities warn that the known potential of live virus vaccine reverting to virulence must be considered. (Once it passes through the body it can regain strength.) The best way to prevent such a possibility, they feel, is to get everybody inoculated.

Such a mass program would almost necessarily entail a government program, some observers feel. This would by-pass both the physician and the pharmacist. Public Health officials will argue that one of the advantages of the oral vaccine is its expected lower price, and distributing it at wholesale price will enhance its economic value.

The medical profession, which originally wanted the Salk vaccine distributed to private doctors and administered by them, will have even less of a basis for argument now since the new vaccine can presumably be administered by layman-run clinics. The American Medical Assn. has not yet formulated any policy on the program.

Whether the government will purchase the vaccine and distribute it free will have to be settled, too. With the Salk serum, Congress appropriated some funds to supply vaccine to the needy, but other free inoculation clinics were financed mostly by state health services and the National Polio Foundation.

**The cost of shipping chemical products will rise slightly** if the Interstate Commerce Commission approves freight rate increases being sought by the railroads. Here's what the rails are seeking:

*Line-haul rates* on all commodities for which rates are quoted in cents per hundred pounds—except coal—would go up by  $\frac{1}{2}\text{¢}$  in cases where present rates do not exceed 65¢. Otherwise they would be increased 1¢.

*Per-ton rates* would be increased 10¢ per net ton and 11¢ per gross ton on rates not exceeding \$13. On those exceeding \$13, the increase would be 20¢/net ton and 22¢/gross ton.

*Per-car rates* would be hiked generally by \$3.

After the proposed rates are filed with ICC, the commission probably will authorize a speed-up procedure whereby rates will go into effect automatically within 30 days unless the commission decides to suspend them pending an inquiry and hearings. If protests are not widespread, the commission may let them take effect automatically after the 30-day period. The increases are small—generally about 1%—and the railroads cite increased costs, principally from recently granted wage increases, as the basis for their request.

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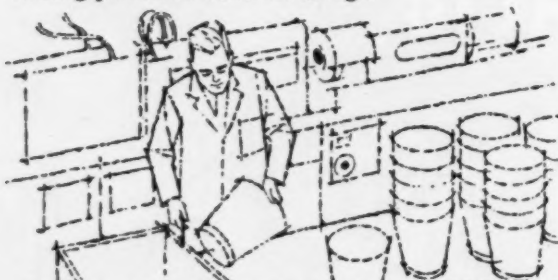
## Chemicals from Armour for the plastics

Manufacturers of plastics and plastic products frequently are faced with production problems such as poor mold release, blocking, electro-static build-up on surfaces and inadequate dispersion of pigments. These problems and many others are being solved through the use of Armour Aliphatic Organic Chemicals. The cost and time-savings these versatile chemicals effect are worth the attention of every manufacturer of plastics and plastic products.

### Mold Release and Anti-block Agents

When improper mold release of polyethylene occurs it necessitates costly and time-consuming operations. Two examples of 'extra' operations are, between-cycle release sprays and frequent cleaning of molds and extrusion dies. Poor anti-block properties lead to storage difficulties with stacked film and molded products.

Armour's Armid® chemicals (Aliphatic Amides) act effectively in solving these problems. The Armids migrate to the surface of the polymer film and act as slip or release agents during both extrusion and storage. In most cases only as little as 0.05% of chemical is necessary. Polyethylene films modified with an Armid chemical can easily be used in high-speed packaging operations. In addition, polyethylene molding equipment will cycle faster, less time is spent cleaning molds, and there is no need for between-cycle sprays. The anti-block properties are passed on to the finished products so there are no stacking or nesting problems while in storage.



Armids for plastic film for food packaging—Makers of plastic film for food packaging should be particularly interested in the use of Armid HT (Stearamide) and

Armid O (Oleamide). Both of these Armour chemicals are listed as acceptable by the Food & Drug Administration for use in the food packaging field.

### Anti-Static Agents

**Vinyl**—Electro-static build-up in vinyl products is a common and annoying problem. Production costs may be unnecessarily high because slip sheeting or other special handling during production and shipment is needed, and severe arcing may occur during calendaring operations. In addition, the finished product will still retain the static charge, causing new problems for the user—unsightly dust collections on display items, annoying shocks built up on automobile seat covers.

Surface treatment of the plastic or vinyl has been used to prevent electro-static build-up, but this method of treatment introduces a new set of difficulties—limited protection time and water spotting (an extra operation if buffing is required after drying).

Search for a better method of eliminating static led Armour to investigate the incorporation of an internal anti-static agent. At present, Armour's Ethofat® C/25 and 60/15 and Ethoquad® C/12 are being incorporated into vinyl formulations. These polyethoxylated chemicals not only eliminate the production and shipping problems involved, but provide the anti-static property to the finished product.

Makers of pigmented plastics will be especially interested in recent work with Armour's aliphatic-organic coated pigments. When coated pigments are incorporated into polyvinyl chloride plastisols they impart internal anti-static properties to the fused sheet.

**Fiber-glass**—When producing resin fiber-glass structures, such as boats or chairs, a mixture of glass rovings and resin is sprayed onto a mold. As the rovings are delivered to the chopping head an electro-static charge is developed that causes the rovings to migrate to the nearest source of an opposite charge, the metallic spray-gun.



## industry

To overcome this problem, a water solution of Arquad® 12-50 (quaternary ammonium chloride) is used to coat the glass rovings, before they are used in the spray-gun. Work stoppages to clean clogged nozzles are cut sharply and it has been reported that there is an actual increase in the bonding strength of the resins to the glass.

### Pigment Dispersants

Manufacturers of plastisols and other plastics that require pigments should take note of Armour's new combination of Arquad 2C and Ethomeen® S/12, a polyethoxylated amine. Latest reports indicate that the use of these chemicals for pigment dispersion can result in numerous advantages in production and finished product.



After several months aging, plastisols containing pigments coated with Armour chemicals (at left) remain fluid.

Using pigments coated with these chemicals, manufacturers can improve viscosity stability in plastisols, lower initial viscosity, maintain longer working periods for the plastisols, and reduce water and soapy-water extraction. Coatings of Arquad 2C and Ethomeen S/12 will also result in reduced processing time for inclusion of the pigment into the plastisol.

For additional information on all these Armour chemicals for the plastics industry, and for samples for your own testing, use the convenient coupon.

## NEW DEVELOPMENTS FROM ARMOUR

### Armid O

for polypropylene and low pressure polyethylene

Some of the most recent ideas in the plastics industry have come from manufacturers who are investigating new plastic materials.

Two such materials, that have come to light, are polypropylene and low pressure polyethylene. With the increasing use of these versatile materials, the need for certain formulation improvements has become apparent.

In keeping pace with these current developments, manufacturers examined the possibilities of using Armid O in the modification of polypropylene and low pressure polyethylene. Initial investigation has indicated that Armid O is effective in preventing blocking in these plastics, and imparts the same advantages that it does in polyethylene—improved extrusion and more easily handled products.

For additional information on Armid O for polypropylene and low pressure polyethylene, and for samples for your own testing, use the convenient coupon.



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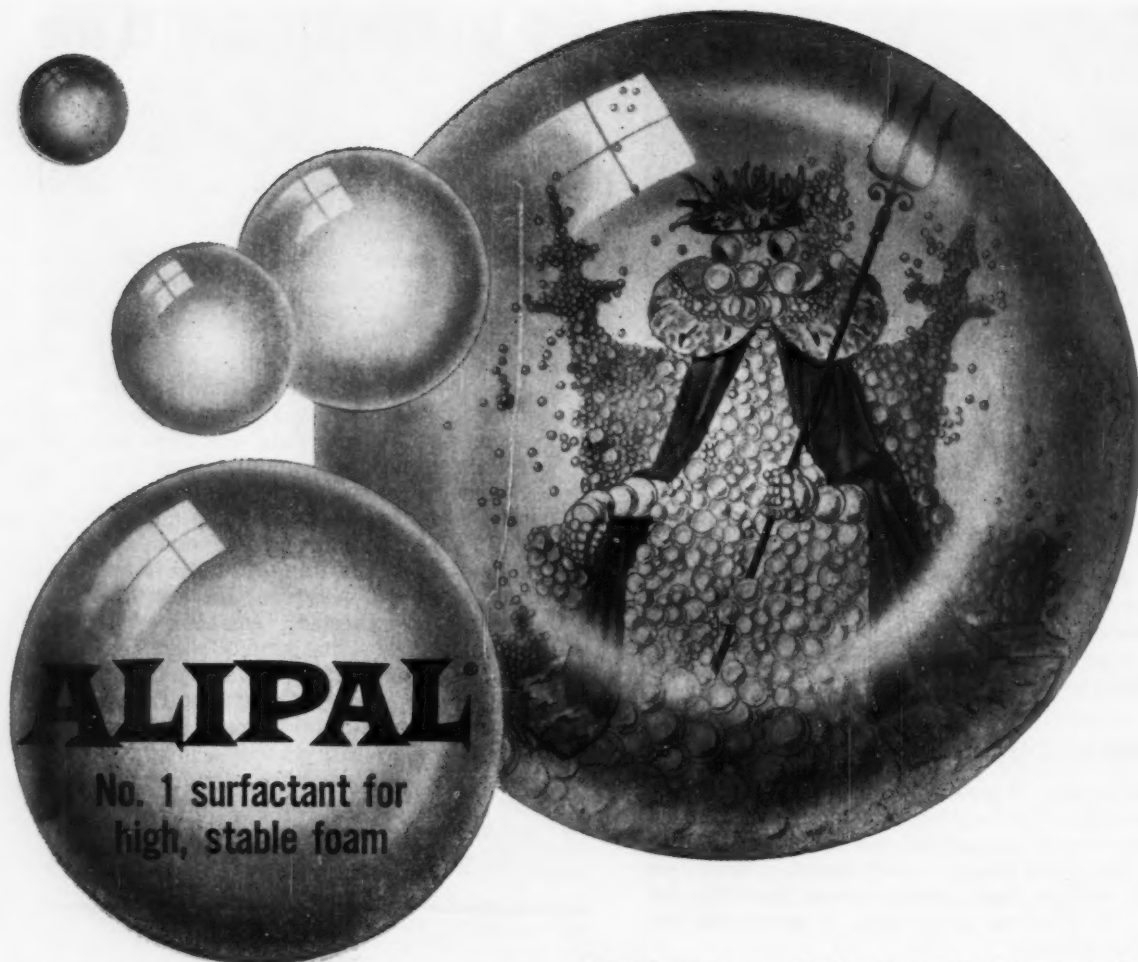
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Alipal anionic surfactants are sold outside the U.S., by distributors all over the world, under the trademark "Fenopon".



New Mississippi agency headed by Andrew Suttle (right) plans ways to lure industrial research.

CW PHOTOS—C. SUTHERLAND

## Research Becomes an Affair of State

A new idea in state agencies is taking shape this week as researcher Andrew Suttle (above) directs the initial steps of the Mississippi Industrial and Technological Research Commission. His work represents a new technique in the increasingly competitive business of luring industry.

Suttle's team is doing this through a wide variety of research activities. Among them: offering research services to industry on a contract basis; carrying out physical research as well as studies of natural resources and other economic surveys; cooperating with universities in offering advanced science courses; and establishing and administering a research park.

This broad sweep of responsibility in the research area makes the efforts of the new commission a distinctly unusual endeavor by a state government. Almost all states have

industrial development agencies, but Mississippi is the first to add a research arm dedicated to this purpose.

**Campaign Pledge:** Establishment of the research commission helped Gov. Ross Barnett fulfill a pledge he made while campaigning for office a year ago: that he would take steps to improve the state's economic status.

Before his inauguration, he and several key members of the state legislature attended a "Nuclear Future Conference" that brought speakers from across the country to Jackson, the state capital. Among these speakers was Suttle, a senior research chemist and physicist at Humble Oil & Refining Co.'s Baytown, Tex., facilities. His topic, "Profitable Areas for Research and Development," helped spark the idea for the commission.

After looking into Suttle's research

background the Mississippi officials asked Humble to lend his services to the state for a three-year period. Humble, with a big interest in the state's welfare—and tax programs—because of its extensive oil and gas exploration and production there, and contemplating the valuable experience that would accrue to one of its promising young scientists, agreed to give Suttle a leave of absence.

Legislative approval to hire Suttle came fast. A key step in convincing the lawmakers of the importance of research was an address given to a joint session of the legislature by nuclear physicist Edward Teller.

**Broad Duties:** In writing the law that created the research commission, the legislators provided for an agency with these broad responsibilities: "... to inaugurate and to continue a broad and effective program of research,



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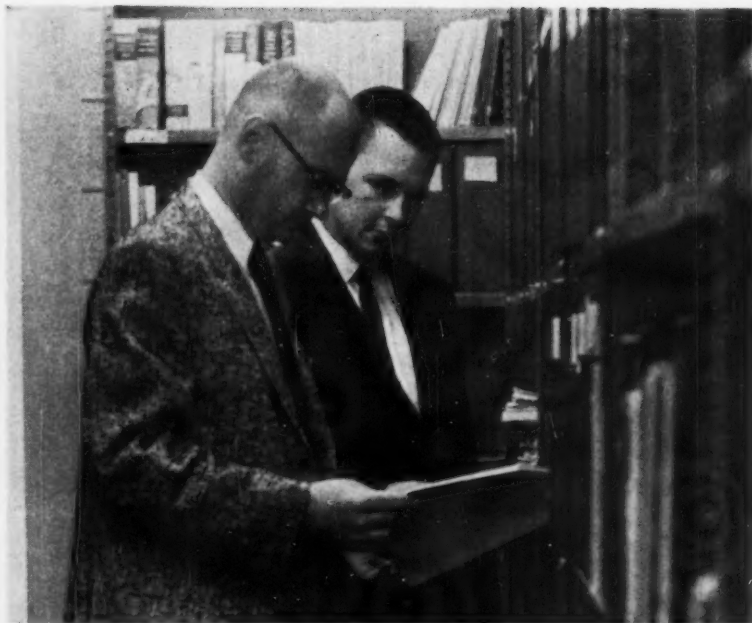
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## RESEARCH



Suttle (foreground) brings scientific background to new position.

economic, technological and otherwise, as a basis of direction and guidance for the work of the industrial and economic development of this state."

In explaining the apparent vagueness of the law, its authors added, "This definition of the duties of the commission is made very broad and flexible because it is the purpose of the legislature . . . to create a state agency that . . . will take advantage of every possible opportunity in the new and rapidly expanding fields of technology and science, and it is not the . . . desire of the legislature to limit the work of this commission . . . by a definition that could prove restrictive. . . ."

The act permits the commission to establish at least two departments: a scientific and technological division and an economic and industrial division. In addition, it authorizes the establishment of a research center and research parks.

The budget appropriated for the commission is \$350,000 for its first two years, plus \$500,000 for initial work in establishing a research park.

**Suttle's Plans:** Suttle sees the work of the commission divided about 40% for long-range or fundamental research, 30% for engineering development and 30% for economic studies.

Early major undertakings will be

studies of the industrial potential of nuclear explosions in salt domes—the resultant molten salt could be an excellent reservoir of heat. Suttle specialized in nuclear physics and applications studies at Humble, is getting help from the Atomic Energy Commission and the Lawrence Radiation Laboratory at the University of California at Berkeley. Preparations for the explosions are expected to take two to three years.

Suttle is also keenly interested in research on ceramics, agricultural chemistry, wood products, and utilization of ground and surface water—all subjects of importance to the state's economic development.

Four or five sites are being actively considered for the research park, with the nod likely to go to an area with a specific and permanent research need.

Other plans: studies of nuclear explosions to deepen the Mississippi River and to open a waterway in the northeast part of the state, a complete manufacturing index and an atlas of potential plant sites, and evaluation of the state's natural resources.

Diverse as these activities are, they are reasonably concentrated when compared with setups in other states, which often assign all "industrial development" programs to a single agency that also has jurisdiction over

to the...  
plant. The new fluids building will  
the plant's manufacturing buildings to seven  
and total facilities to 15 major buildings.

## U.S. Borax Announces Lithium Sales Agreement

United States Borax & Chemical Corporation announces that it has entered into a sales agreement with Lithium Corporation of America covering sales of lithium compounds to the ceramic and glass industries in the United States and certain adjacent markets. The cooperative arrangement calls for joint promotion and development of other industrial uses for lithium by the two firms.

U.S. Borax is the world's leading producer of borax, borates, boron compounds and chemicals. Lithium Corp. is one of the foremost specialists in the production of lithium carbonate and other lithium compounds.

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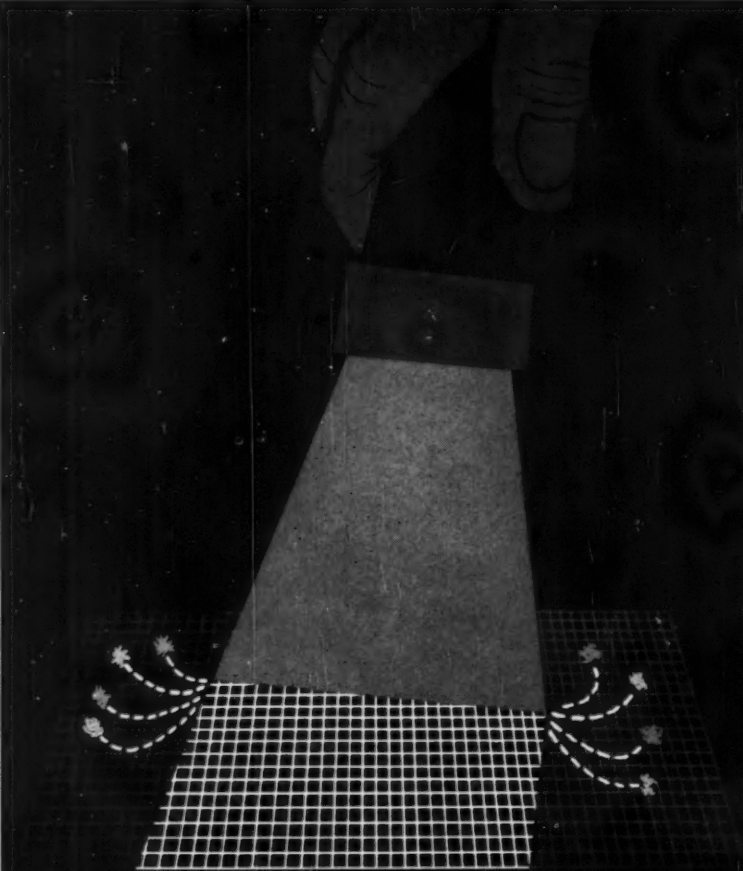
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## RESEARCH

all kinds of planning, including urban renewal and housing. Mississippi has taken the necessary step of channeling its industrial development into different agencies that serve different purposes. And the creation of its specifically research-oriented agency marks a significant, novel step in recognizing the need of technically trained executives to help in the overall job.

## Reaction Tester

A new, highly accurate method of measuring chemical reaction rates, using sound waves, is under investigation by physicist Harvey Blend at the University of California (Los Angeles). Working with reactions that occur in the one-millionth-of-a-second range, Blend subjects them to sound waves in an apparatus he designed himself. Minute changes in wave velocity (which changes with the time of the reaction), as well as changes as little as  $4 \times 10^{-4}$  in. in wavelength and frequency changes of one cycle in a million can be measured. The technique is said to represent a new high in accuracy. Sound waves are sent in short bursts to eliminate echoes. Blend sees important applications for his data in basic probes of how molecules combine and separate during chemical reactions.

## Staph Fighter

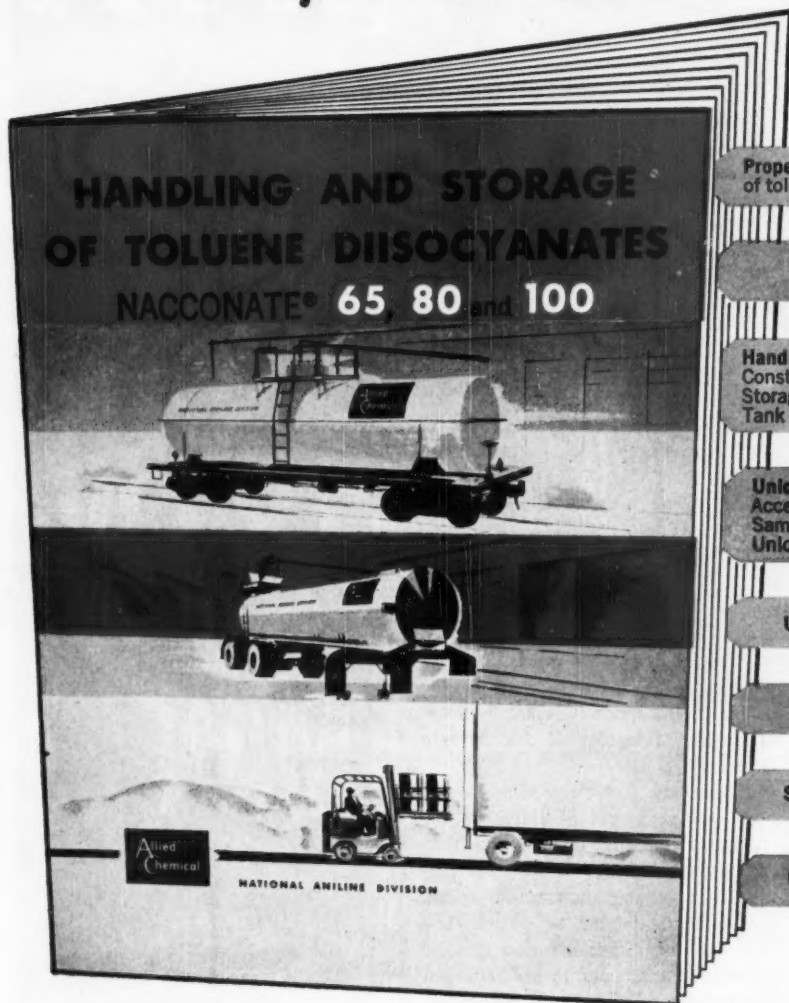
A new form of penicillin (code number X-1497) that attacks antibiotic-resistant staphylococcus bacteria (so-called "hospital staph") has been developed by Bristol Laboratories (Syracuse, N.Y.), division of Bristol-Myers. The compound, which Bristol is describing in detail at a symposium in Syracuse this week, will be on the market in two months.

The new drug is the latest product to emerge from the development agreement between Bristol and The Beecham Group, Ltd. (England). Beecham's isolation of 6-amino-penicillanic acid (*CW Technology Newsletter*, March 14, '59) was the forerunner of new synthetic forms. Bristol's Syncillin, introduced last year, typifies a penicillin that has been modified so it can be absorbed into the blood more quickly.

Chas. Pfizer & Co., Inc. (Brooklyn), has a similar drug called Maxipen.

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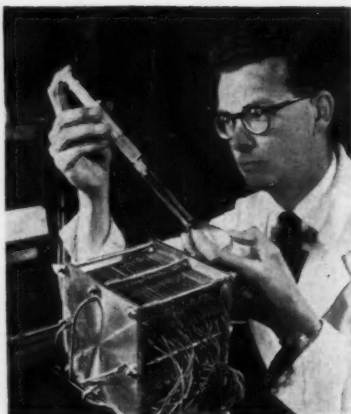
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# Lee

## RESEARCH



Shell cell burns hydrogen and oxygen.

### Compact Fuel Cell

Three to five times more power per unit volume than competitive low-temperature fuel cells is the claim for this new fuel cell (*above*). Researchers at the Thornton Research Center of Shell Research Ltd. (London) currently have the 20-unit cell under development. It produces 50 watts at 250 C.

Shell says the new fuel cell electrodes are cheap and easily fabricated. (A fuel cell consists of two porous electrodes separated by an electrolyte. The fuel—often hydrogen—is fed to one electrode and oxygen or air to the other. Chemical energy of the fuel is converted directly into electricity.)

Details of the electrodes haven't been disclosed, but Shell calls them "radically different," capable of achieving current densities of 70 amperes/sq.ft. at room temperature and double that amount at 60 C. The cells can use either alkaline or acid electrolytes and operate on hydrogen plus oxygen or air at 3 psi. Power/cu. ft. is 3 to 5 kw. The company believes that power-to-weight ratios of 50 watts/lb. are possible (when lightweight construction—e.g., plastic instead of steel end plates—is used). This compares with 9.1 watts/lb. claimed for certain other fuel cells (*CW*, July 30, p. 28) now in development.

Says Shell Research Ltd. Director C.G. Williams, "Shell's interest in the fuel cell stems from the fact that the oil industry is a supplier of fuels and no one has yet decided just what kind of fuel will best suit the fuel cell of the future."

# If...

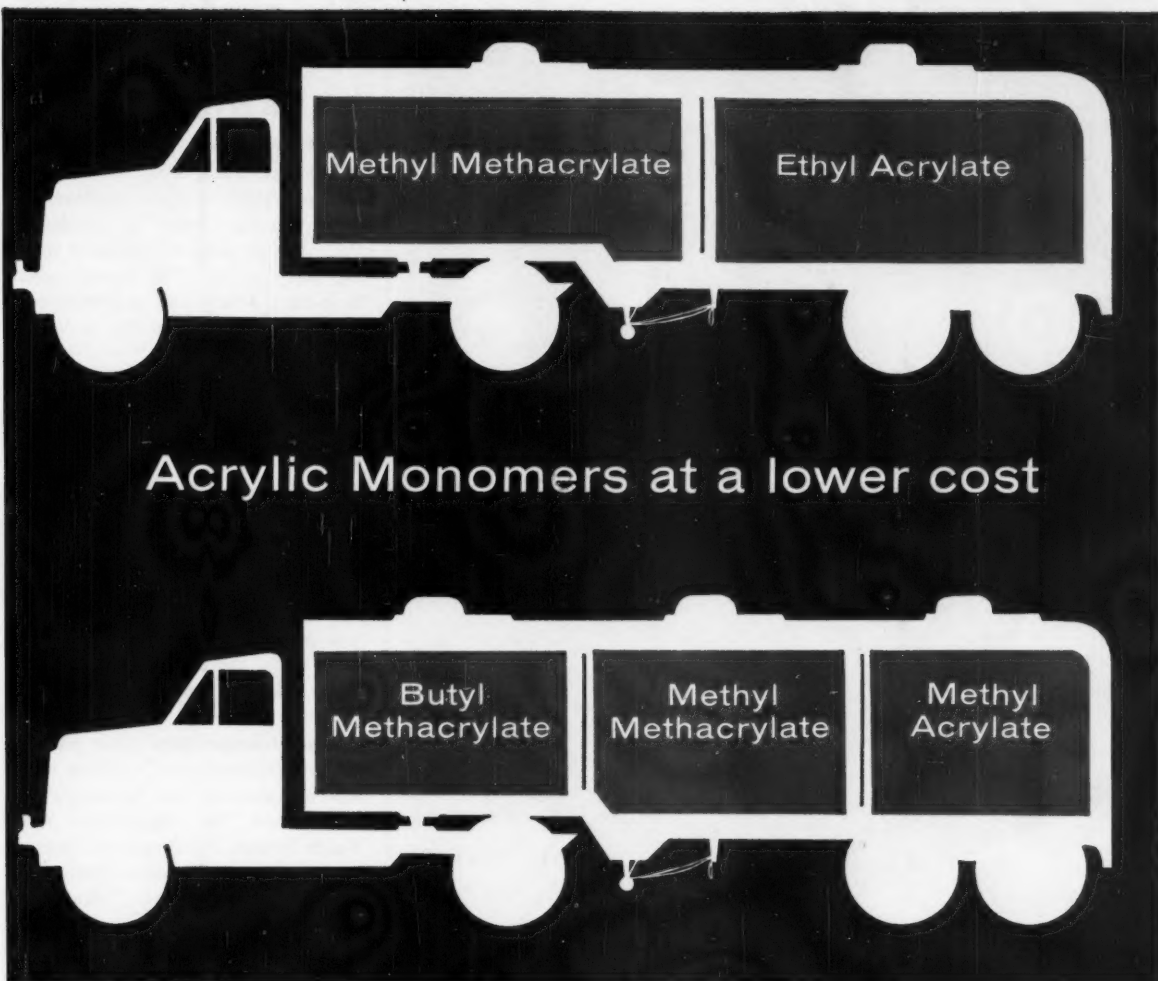
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CHEMICAL WEEK BUYER'S GUIDE, Pages 173-176  
CHEMICAL MATERIALS CATALOG, Pages 551-554.



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## RESEARCH

### EXPANSION

- Pennsylvania State University (University Park, Pa.) has acquired Curtiss-Wright Corp.'s multimillion-dollar nuclear center at Quehanna, Pa., plans to add an accelerator building early in '61. The center, which includes a 4-megawatt swimming-pool reactor, was donated by C-W for educational purposes.

- Charles Bruning Co. Inc. (Mount Prospect, Ill.) has built a new center for research in photo-reproduction processes.

### PRODUCTS

- **Biochemical Adds:** Lachat Biochemical Co. (2202 West 107th Pl., Chicago 43) is adding pure nitriles and pure ketones to its offerings of fatty acids, the corresponding methyl esters, alcohols and amines.

- **Drug Intermediates:** New pharmaceutical intermediates available in research quantities from Sapon Laboratories (101 East Hawthorne Ave., Valley Stream, N.Y.) include 2-bromobenzylamine, 2-fluorobenzylamine, 3-iodobenzaldehyde, and 3-thiophenecarboxylic acid.

- **Metal Entries:** Linde Co., division of Union Carbide Corp. (New York), has developed a process for producing spherical metal particles ranging in size from 20 to 150 microns. Copper, nickel, aluminum and tungsten are among the metals available in the new form.

- Gallium and arsenic, each 99.9999% pure, are newly available from Semi-Elements, Inc. (Saxonburg Blvd., Saxonburg, Pa.).

### APPARATUS

- **Tear Tester:** The Albert Torsion Tear tester, developed for measuring shear strength or tearing resistance of directional materials (e.g., shipping tape, corrugated boxboard, textiles, highly calendered rubber stocks) that usually tear at right angles to the direction of greatest strength, is now offered by Thwing-Albert Instrument Co. (Penn St. and Pulaski Ave., Philadelphia 44, Pa.).

- **Microbe Mill:** A new mill for rupturing large quantities of microorgan-



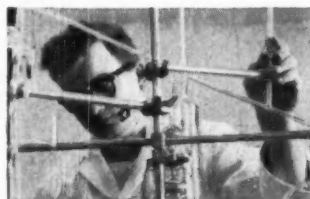
**M**ILLIMICRON HEADQUARTERS is an apt name for Columbian Carbon's new research center in Princeton, N. J. Because it is devoted to the study of carbon black particles so tiny they must be measured in millimicrons . . . particles that play vital roles in the manufacture of rubber, paint, ink and plastic products.

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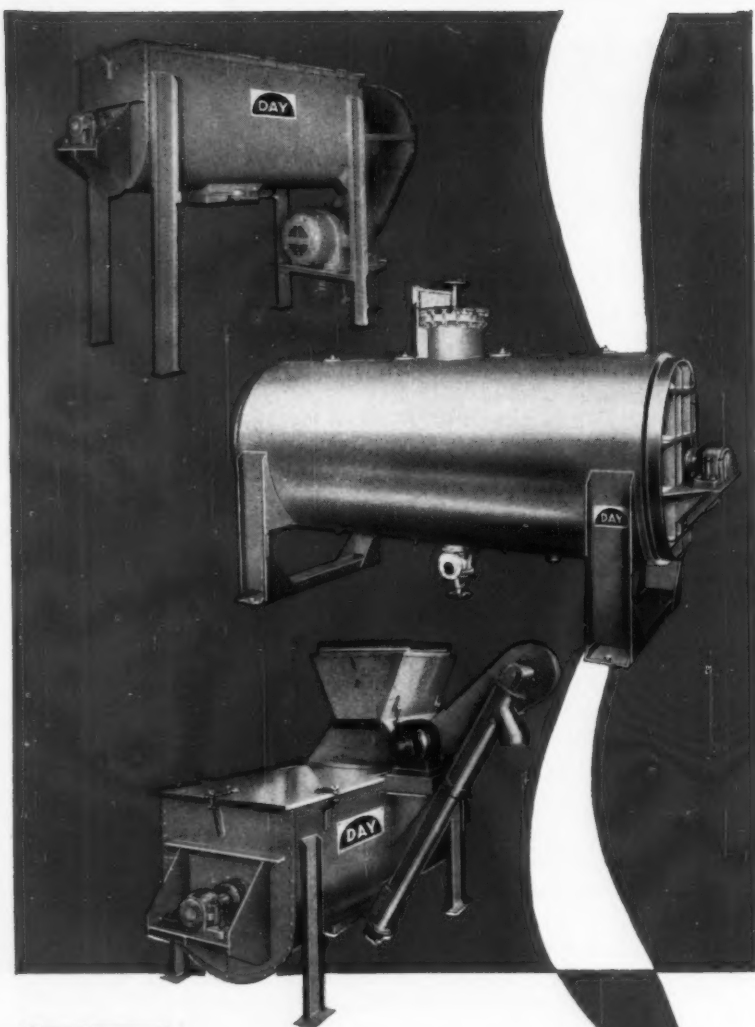
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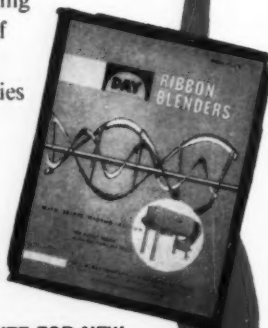
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## RESEARCH

isms has been developed by Gifford-Wood Co. (Hudson, N.Y.). It handles bacteria, spores, moulds, yeast and pollen granules in 150-2,000-ml. quantities, is reportedly useful in research on cell proteins and enzymes and viruses.

**Ground Gainer:** The Nasco-Asplin soil pulverizer, developed in the soils laboratory of the University of Wisconsin, pulverizes soil samples in preparation for soil analysis in less than a minute. The new device is "practically dustless" in operation, can process samples eight times faster than handgrinders, produces particles without grinding them into powder. It will be manufactured and distributed by National Agricultural Supply Co. (Fort Atkinson, Wis.).

**1000 F Ovens:** Despatch Oven Co. (619 S.E. Eighth St., Minneapolis) is offering a new line of "Top Temp" V-series laboratory ovens for operation at temperatures up to 1000 F.

• Gruenberg Electric Co., Inc. (9 Commercial Ave., Garden City, N.Y.), now offers its BHT line of bench ovens designed for use at 1000 F and available in sizes of 1, 3 and 8 cu.ft.

## LITERATURE

• "Materials Research in the Navy" is a new, two-volume collection of reports covering the proceedings of the Office of Naval Research's Third Navy Science Symposium. It's available (as PB 161470,1) from the Office of Technical Services, U.S. Dept. of Commerce (Washington 25, D.C.) for \$11.

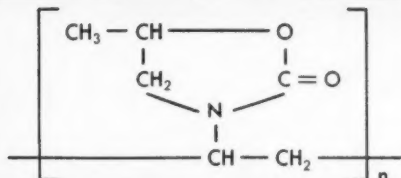
• More than 3,700 newly synthesized compounds are reported in the first issue of "Index Chemicus," a monthly index to new chemicals reported in the scientific literature. The publisher, originally called Eugene Garfield Associates (CW, Jan. 23, p. 38), is now named Institute for Scientific Information (1122 Spring Garden St., Philadelphia 23).

• Schwarz BioResearch, Inc. (Mt. Vernon, N.Y.), has issued a new price list, covering more than 300 biochemicals and radiochemicals. Among the new offerings: dehydrated firefly tails, used in investigations of bioluminescence and as a reagent for measuring adenosine triphosphate.



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130**



## **DEVLEX 130**

## **DEVLEX A515**

new functional polymers display  
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Devlex is Dow's trademark for a series of unique new functional polymers. Two products are currently available in semi-commercial quantities: Devlex 130, poly-N-vinyl-5-methyl-2-oxazolidinone, and Devlex A515, vinyl acetate copolymer of N-vinyl-5-methyl-2-oxazolidinone. Both are white, odorless, free-flowing powders. Devlex 130 resin is readily soluble in water and a limited group of organic solvents, while Devlex A515 resin exhibits broad solvent compatibility but low water sensitivity.

A wide range of organic complexes, and several inorganic complexes, may be prepared utilizing Devlex resins. Complexing provides a means of modifying the solubility, volatility, stability, toxicity properties, and—in some cases—the odor and taste of complexed molecules without altering their chemical nature.

The film-forming properties of Devlex resins are of particular utility on proteinaceous and cellulosic substrates, such as cotton, wool, skin, leather, plant foliage, and paper.

The cosmetic industry should find utility for the Devlex products as hair fixatives in preparations such as hair sprays and grooming aids, wave sets and shampoos. The advantages provided include increased body and sheen with a natural feel, protection against excessive build-up of static electricity and better control following washing.

Other actual and potential applications include tablet binding and coating, clarification and stabilization of beer and wines by the complex-precipitation of certain phenolic compounds, dye levelling and stripping, safening of many biologically active materials, and in the formulation of waxes, polishes and inks. Food and drug applications are being explored with special developmental grades of Devlex resins which are available in experimental quantities.

Further information on Devlex products, as well as samples, may be obtained from The Dow Chemical Company, Technical Service and Development, Midland, Michigan. Dept. 604AM9-10.

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September 10, 1960 CHEMICAL WEEK 67



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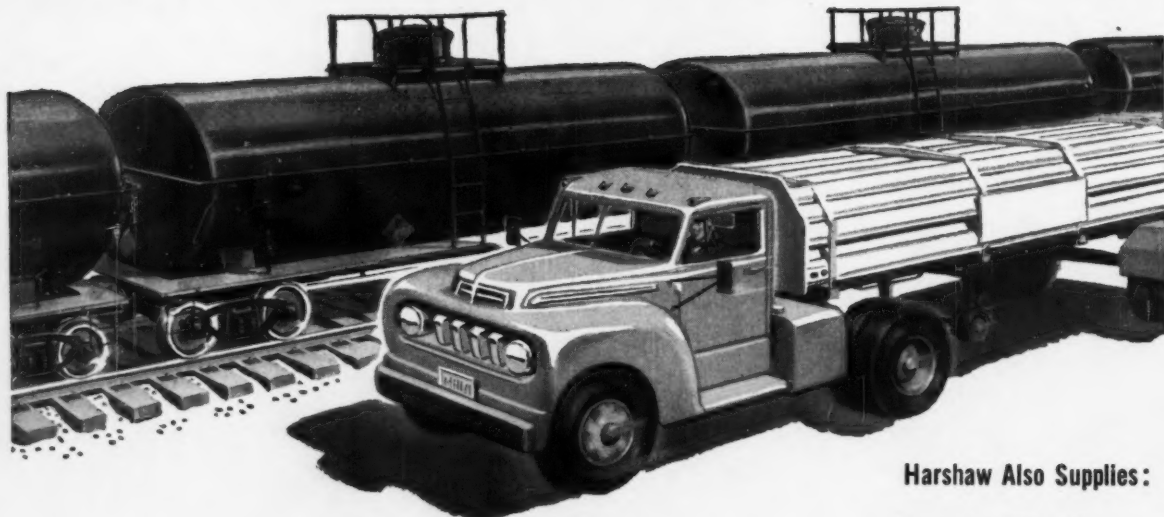
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Metallic Fluoborates  
Potassium Bifluoride  
Potassium Chromium Fluoride  
Potassium Fluoborate  
Potassium Fluoride  
Potassium Titanium Fluoride  
Silico Fluorides  
Silicon Tetrafluoride  
Sodium Fluoborate  
Tin Fluoborate  
Zinc Fluoborate  
Zinc Fluoride





## SPECIAL REPORT RED CHINA



China's forced growth, aided by massive Soviet aid such as this steel mill, poses the question . . .

# Far East Chemical Threat?

**In Communism's campaign against the West, Red China's industry looms as a weapon. Here's a look at China's chemical prospects.**

Because of the political and ideological strains showing up in Communist China's relations with the Soviet Union, speculation is rife about a "split" between the two countries. The Red Colossus of the Far East, many experts believe, wants to go its own way—taking its gains and making trouble where it chooses.

But for all its bluster and capacity to stir trouble, Red China will require decades to develop the industrial muscle and self-sufficiency to stand alone among the prime powers of the world.

Back in 1955, Communist Chinese planners anticipated building a significant industrial base by '67, but

they admitted that it would be 40 to 50 years before China could become "a powerful country with a high degree of socialist industrialization." China's economic performance has proved that the planners were not overly pessimistic.

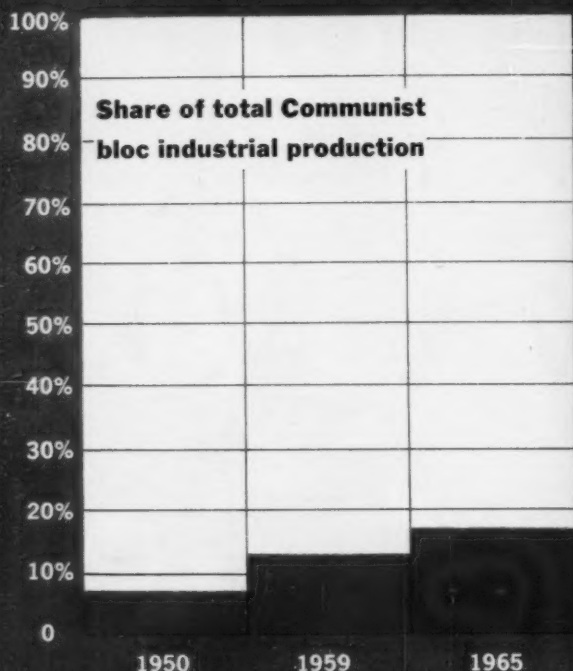
And if industry as a whole is China's weakness, the Chinese themselves admit that the "weakest link" within its industry is the chemical industry.

**Short on Chemicals:** Despite rapid chemical production expansion in recent years, domestic output of several key items still is far short of internal needs. For example, the ratio of domestic output to consump-

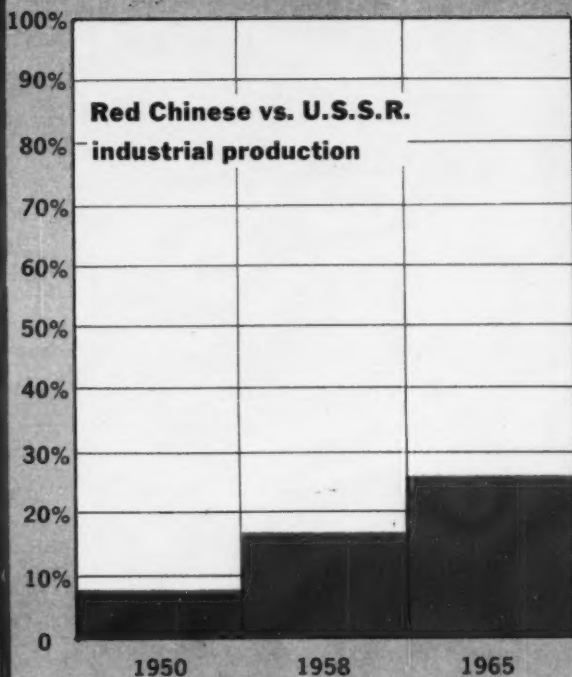


## SPECIAL REPORT RED CHINA

### Red China Looms Larger in Communist Bloc Industry



Source: U.S. Central Intelligence Agency.



Source: U.S. Central Intelligence Agency.

tion is about 50% for chemical fertilizers, 69% for sulfuric acid, 70% for soda ash, 56% for benzene.

If you believe the Chinese, output of sulfuric acid increased 15-fold between '49 and '58. In absolute terms, however, the sulfuric acid figure is hardly spectacular: 611,000 tons in '57, compared with 1 million tons for underdeveloped Spain, and 2.4 million tons for the United Kingdom. By '72, China intends to match the U.K.'s gross output of major industrial products.

And China's chemical industry still has many blank spots, which are revealed even in propaganda figures. It suffers from a critical lack of fertilizers—the most glaring example of its chemical industry's inadequacy. With minimum annual needs estimated at 15-20 million tons, China last year produced only 1.33 million tons of chemical fertilizers.

Experts vary on just how much progress China's chemical industry has made. But all agree that the gap between its production and internal requirements is too great to be overcome in the near future.

**Common Problems:** To a considerable extent, the problems of China's chemical industry are shared by

the economy as a whole: lack of capital, trained personnel and training facilities; shortages of transportation, fuel, power; a puny capital goods industry.

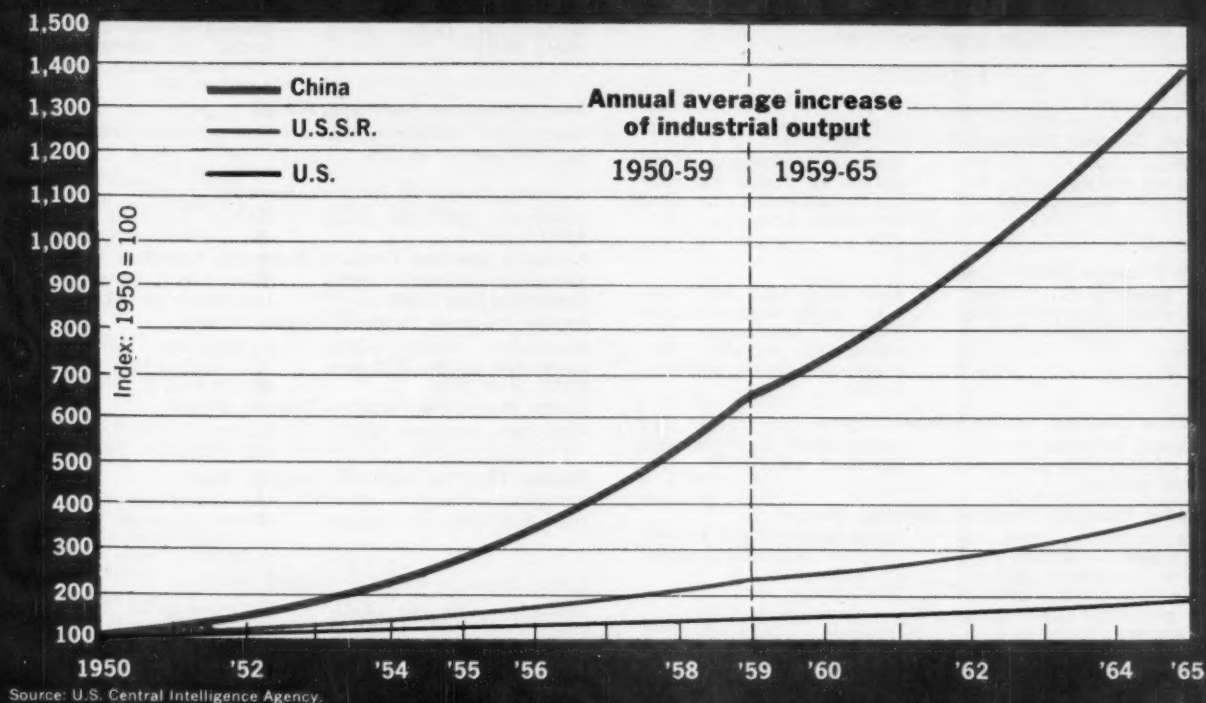
On this shaky base, Red planners are attempting to throw up a towering industrial and economic establishment. In '58, the start of the second five-year plan, the Communist rulers proclaimed their "great leap forward"—designed to match Britain industrially by '72—and early in '59 announced fantastic strides toward that goal.

But by fall they had to reveal that their earlier claims were wrong, that output of grain, cotton, steel and coal fell far short of boastful '58 goals; that the '59 goals for these products would have to be reduced.

**Progress Nevertheless:** But it would be a mistake to completely write off China's industrial achievements. Despite the flaws, they have been dramatic.

Many Western experts believe that Chinese figures for '55-'57 were relatively accurate. Working from these, they agree that China's gross national product grew about 7-8%/year during the first five-year plan—twice the rate of India's growth. Industrial production grew at the impressive rate of 23%/year, on the

## Red China's Industrial Surge



average, between '50 and '59, and will likely grow by 14%/year at least until '65, according to estimates of the U.S. Central Intelligence Agency.

The Communist bloc as a whole is growing faster than the West, and within the Communist bloc China is steadily becoming a more important industrial factor. It may reach 25% of Russia's output by '65.

**Chemical Strides:** Little reliable data is available on Chinese chemical growth. By Chinese accounts, of course, it has been substantial. In '49, the year the Communists took control of China, the chemical industry accounted for 1.5% of the gross value of industrial output—which was miniscule after China's long ordeal of war.

By '57, this share is claimed to have increased to 6.6%, and it has evidently continued to rise since then. Gross chemical output is claimed to have risen fourfold between '52 and '57, and then to have doubled between '57 and '58. (Western experts discount such claims.) During the '52-'57 period, China claims to have built about 30 large chemical plants, and 70 major construction projects are supposed to be under way.

A timetable of initial trial production of products

new to China include: aniline and glacial acetic acid ('53); syntomycin and sodium nitrate ('55); polyvinyl chloride, Aureomycin, acetone, laminated glass ('56); methanol, variamine B, penicillin, synthetic fibers and synthetic leather ('57); reactive dyestuffs, organosilicon resins, chloroprene rubber, synthetic detergents ('58).

Vice-Minister of the Chemical Industry Wu Li-ping claimed that China could "catch up with or surpass Britain in the output of chemical fertilizers, sulfuric acid, synthetic fibers, and antibiotics in '62" (see chart, p. 78). These targets seem to contain a good measure of wishful thinking.

During the second plan the Communists hope to triple the amount invested in the chemical industry during the first plan. This would come to 2.4 billion Yuan (the U.S. government now figures \$1 equals 2.45 Yuan, although Chinese cost figures probably aren't very meaningful). Of these investments, 62.5% is slated to go into the chemical fertilizer industry, compared with 46.9% in the first plan.

**Fertilizer Famine:** There is an impelling reason for the stress on fertilizer production. China's population is now about 660 million, and growing by some 12 mil-



## SPECIAL REPORT RED CHINA

# Communist China's Major Chemical Plants

### Products, Capacity

(figures in '000 metric tons/year)

### Comments

## Fertilizers

### Large Central-state Projects

#### Dairen Chemical Works, Dairen, Liaoning

Synthetic ammonia (96), ammonium sulfate (385); sulfuric acid, soda ash, etc.

Built by Japanese in 1935, gutted by Russia. Capacity being expanded to 800 m.t./year ammonium sulfate.

#### Kirin Chemical Fertilizer, Kirin

Syn. ammonia (50); ammonium nitrate (90); nitric acid, oxygen, nitrogen.

First stage built with Russian equipment. Ultimate capacity: ammonia, 270; ammonium nitrate, 300. Principal Chinese chemical center.

#### Lanchow Chemical Works, Lanchow, Kansu

Synthetic ammonia, ammonium nitrate (130); nitric acid; methyl alcohol.

Soviet aided; Synthetic rubber plant being built

#### Nanking Phosphate Fertilizer, Nanking, Kiangsu

Superphosphate, triple superphosphate, calcium magnesium phosphate, defluorinated phosphate, ammonium phosphate (total, 200); sulfuric acid.

Soviet technical aid. Started up June '58. Ultimate capacity: 400.

#### Szechuen Chem. Fertilizer Chint'ang haien, Szechuen

Synthetic ammonia (28); sulfuric acid (240), ammonium sulfate (290), ammonium nitrate (55), nitric acid.

Chinese design, Czech equipment. First stage completed in '59.

#### Taiyuan Chemical Fertilizer, Taiyuan, Shansi

Synthetic ammonia, ammonium nitrate, phosphate fertilizers (200).

Soviet aid. In partial operation. Part of Taiyuan Chemical Works.

#### Yungli Chemical Works, Nanking

Ammonium sulfate (230), synthetic ammonia (78), sulfuric acid, nitric acid, potassium fertilizer.

Chief engineer U.S. trained. With Dairen supplies 62% national chemical fertilizer production. Expansion underway. Will make urea, polyimide fiber, etc.

### Local-state Projects

#### Anhui Ammonium Sulfate, Anhwei

Ammonium sulfate (210), synthetic ammonia.

Expanding to 420 ammonium sulfate.

#### Canton Chemical Fertilizer, Canton, Kwangtung

Synthetic ammonia (25), sulfuric acid (80), nitric acid (50), ammonium sulfate (80).

By end of '60 slated to reach: ammonia (50), sulfuric (160), ammonium sulfate (130), urea (42), nitrogen (81).

#### Chanchiang Phosphatic Fertilizer, Chanchiang, Kwangtung

Superphosphate (100).

Capacity to double.

#### Chengtzu, Szechwan

Ammonium sulfate (290), ammonium nitrate (55), sulfuric acid (240), nitric acid.

Being expanded.

#### Honan Chemical Fertilizer, Kaifeng, Honan

Nitrogenous (200), phosphate (200).

Started in '58; first phase slated for completion in '59; second phase to bring to 1,000 in '62.

#### Kiangsi Ammonia, Nanchang, Kiangsi

Ammonium sulfate (40), Synthetic ammonia (20).

Due onstream late '59. Expansion slated to up ammonia to 50.

#### Kunyang Phosphatic Fertilizer, Kunyang, Yunnan

Phosphate fertilizers (100-150.)

Built in '57 near 110 million ton phosphorus reserves.

#### Kweiyang Chemical Fertilizer, Kweiyang, Kweichow

Ammonium sulfate (400), superphosphate (200).

Started April '58, full operation slated for '61.

#### Peiping Chemical Fertilizer, Peiping, Hopei

Ammonium nitrate (120), ammonium sulfate (90), synthetic urea (40).

Construction started May '58, first phase due onstream end of '59.

#### Shansi Phosphatic Fertilizer, Taiyuan, Shansi

Phosphate fertilizers (200).

Started March '57; producing since June '58.

#### Tientsin Chemical Fertilizer, Tientsin, Hopei

Ammonium chloride (320), soda ash (320).

Due completed '61. Like Dairen, produces two products simultaneously, cutting costs 40%. Hou process.

#### Tsinan Chemical Fertilizer, Tsinan, Shantung

Synthetic ammonia (50), ammonium nitrate (128) in first phase.

Started Aug. '58. First phase completion, slated '60; second in '62, to ammonia (100), ammonium nitrate (256).

#### Yunnan Phosphatic Fertilizer, Kunming, Yunnan

Superphosphate, defluorinated phosphate (total 200), triple superphosphate, calcium magnesium phosphate, synthetic ammonia.

Started July '58. Partial production due '59, completion end '62, to produce triple superphosphate (200), calcium magnesium phosphate (100), ammonia (100).

## Industrial Chemicals

### Canton

Caustic (15), hydrochloric acid (10), other chemicals.

Announced underway April '59.

### Chuchow Chemical Works, Chuchow, Hunan

Phosphate fertilizers (100), sulfuric acid, hydrochloric acid, liquid chlorine, caustic, bleaching powder, farm insecticides.

Started Oct. '57, completion date unknown.

### Fukien

Caustic soda (20)

Due onstream in '59.

### Hainan

Sodium chloride, potassium chloride, magnesium chloride, magnesium bromide.

Sea water recovery. Plans announced July, '58.

### Hami, Sinkiang

Soda ash, natural (2.28)

Plans announced April '60.

### Hangchow, Chekiang

Sulfuric acid.

Onstream late '59.

### Heilungkiang Province

Wood chemicals: acetic acid, methanol, active carbon, spirits, dry ice, etc.

40 products, three plants. Slated for completion '60. Polish aid.

**Huhehot, Inner Mongolia**

PVC, caustic, trichlorethylene, hydrochloric acid, calcium carbide, synthetic ammonia.

**Inner Mongolia**

Soda ash. (100).

Two plants, onstream early '60.

**Kirin Calcium Carbide Works**

Calcium carbide.

Oxygen and nitrogen from Kirin Fertilizer. Has 60,000 ton furnaces. Soviet aid.

**Kongmoon, Kwangtung**

Paper pulp (10.95), dry ice (3.65).

Completed late '59. Polish dry ice equipment.

**Lanchow Chemical Works**

Over 30 industrial chemicals.

Major center (see under fertilizers).

**Ningpo, Chekiang**

Sulfuric acid.

Capacity totals 10 with Hangchow. Onstream late '59.

**Shanghai**

Caustic soda (40) Nitric acid (5).

Plans announced April '59.

**Sining, Chinghai**

Sulfuric acid.

Started Nov. '59. Second plant to start in '60.

**Szechuen**

Sulfuric acid (120), soda ash (80).

Announced April '59.

**Taiyuan Chemical Works, Taiyuan, Shansi**

75 products, including electrochemicals, insecticides, sulfuric acid, "benzene powder", fertilizers, pharmaceuticals.

Construction started '56. In partial operation. Soviet aid. See under fertilizers.

**Tangu Chemical Works, Tientsin**

Caustic, insecticides, raw materials for plastics industry.

Expanded in '59.

**Tientsin**

Sulfuric acid (40).

Construction started in '58.

**Tienyuan Chemical, Shanghai**

Caustic, hydrochloric acid.

Produced 7 caustic, 9 acid in 1st qtr. '59.

**Tsaidam Basin, Northwest China**

Potash, potassium chloride, borax, hydrochloric, sulfuric, and nitric acids.

Number of plants at this oil center, near salt deposits.

**Wuhan, Central China**

Based on salt electrolysis.

Nearly 30 chemical projects completed in last two years at this steel center.

**Yuncheng, South Shansi**

Anhydrous sodium sulphate (150), nitrogenous fertilizers

Under construction.

**Yungli-chiuta Works, Tientsin**

Soda

Recently modernized, expanded. Supplies about 1/3 total Chinese soda output.

**Synthetic Fibers****Antung, Manchuria**

Viscose, possibly others.

Originally Japanese built; destroyed and rebuilt in '58. Being expanded to 20 this year.

**Paoting, Hopei**

Viscose (5)

East German design. First stage onstream this summer. Second will up to 10. Tire cord plant being built. First modern cellulosic fiber plant.

**Peking**

Polymide fiber (0.380)

Started up summer '59. East German equipment, design.

**Shanghai**

Viscose, acrylic, polymide (caprolactam type)

Seven plants started in '58, slated for completion '62, to produce total 60.

**Shenyang, Liaoning**

Caprone, caprolactam

Caprolactam started '58, caprone fiber '59.

**Plastics****Canton**

Polyethylene

Experimental. Started up Dec. '58. Low pressure process, using alcohol from sugar.

**Foochow, Fukien**

PVC, furfural resins, caustic, insecticides

Onstream fall '59.

**Schenjang**

Phenolic resins

**Tientsin Chemical**

Polyvinyl chloride resin (6)

To triple output in '60.

**Specialty Chemicals****Kirin Dye Works**

30 dye intermediates, several fine dyes, including indanthrene.

Nitric acid from Kirin Fertilizer. Recovers sulfuric and hydrochloric acids, other products from waste.

**Shansi Province**

Pesticides, hormones

Under construction.

**Shanghai**

Dipterex, other high-grade insecticides (10).

Onstream July '59. Biggest liquid pesticide plant in China.

**Shanghai**

Dyestuffs, reactivated dyes

Several plants.

**Tientsin**

Dyestuffs

In partial production, to reach 15 by '62, partially for export.

**Pharmaceuticals****Chinghai**

Terramycin, solvents.

Reported onstream April '60.

**Foochow**

Aureomycin, Vitamin B12, dry mycelium (by-product).

Under construction.

**Inner Mongolia**

Ephedran (0.048)

Partly for export to U.S.S.R., S.E. Asia. 42

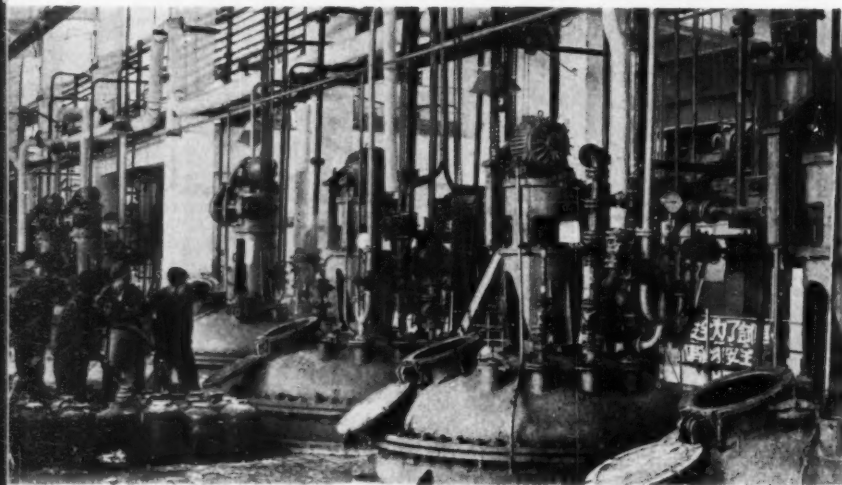
**Shanghai**

Streptomycin (0.042), Sodium para-amino-salicylic acid, tetracycline, procaine penicillin.

Production started end of '59. Soviet aided. China's second streptomycin plant. Reportedly China's largest pharmaceutical plant.

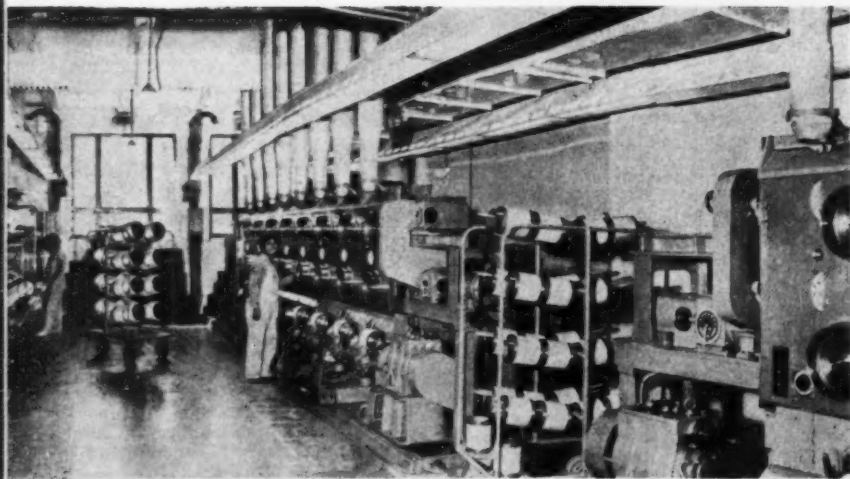
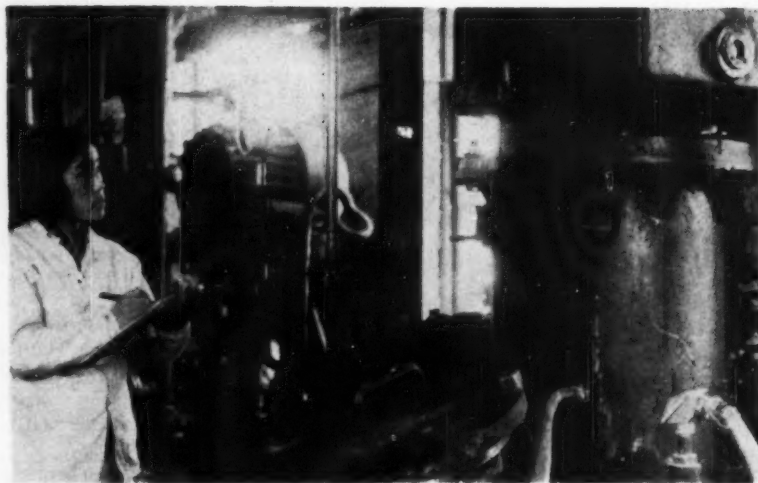
# ★ SPECIAL REPORT RED CHINA

**Pictures from behind 'bamboo curtain' give clues to strengths**



Checking drums of caustic soda for shipment from the old Dairen fertilizer and chemical plant. In a modern U.S. plant these drums would be labeled before they were filled and weighed automatically. But China is long on unskilled labor, short on modern equipment.

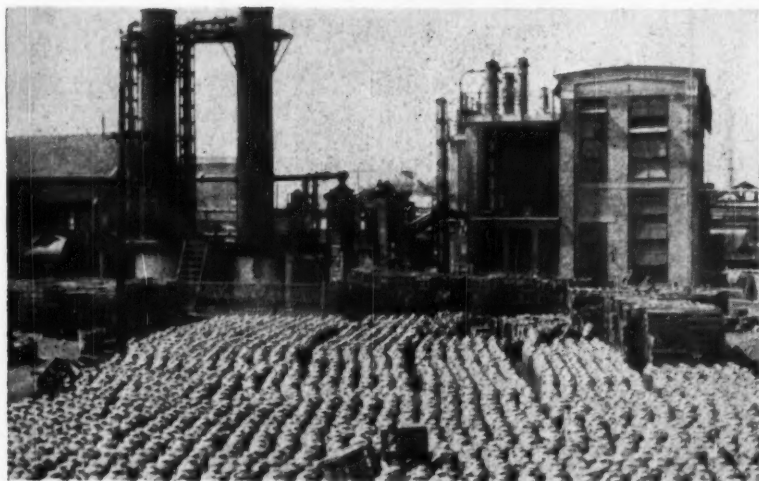
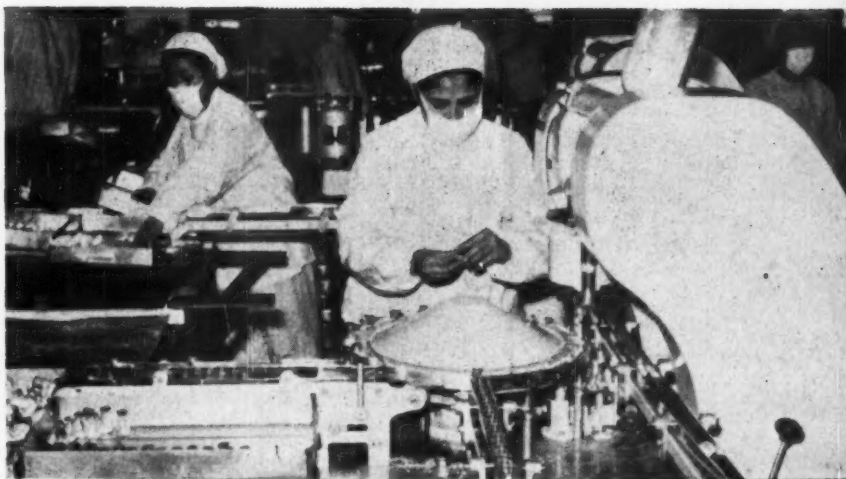
Makeshift equipment at Tientsing PVC plant. Note oversized pipe to pressure gauge, rope supporting pipe. Thermocouple head (lower right) seems standard, but not the mount: a 'dutchman,' a weld, and a clumsy union. Lack of standardization is evidently prevalent in Chinese industry.



Since the industry is new, most Chinese synthetic fiber equipment is modern, such as this nylon equipment at the 380-tons/year Peking synthetic fiber plant, which started up last summer. East Germany supplied the equipment and design, as it did for the Paoting viscose plant.

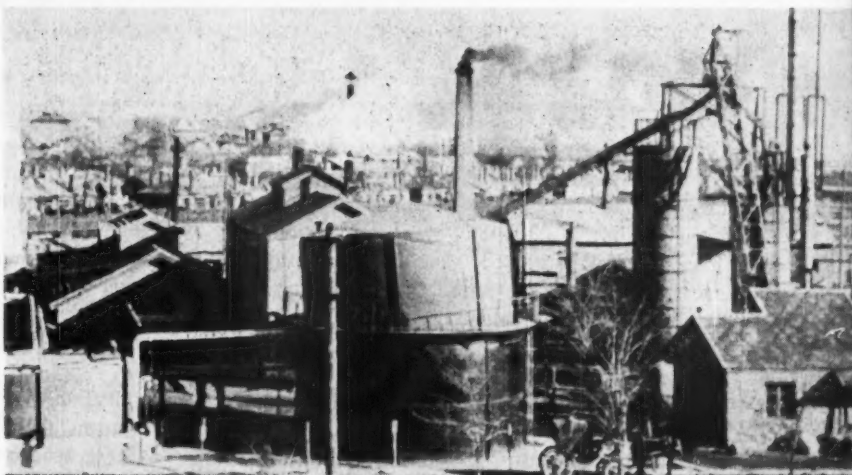
## and weaknesses of Communist China's production technology

Equipment at No. 4 plant of Shanghai pharmaceutical complex (China's biggest) is modern, judging by this bottling machine, which handles 33,000 vials in eight hours. One of hundreds of Soviet aid projects, the plant is off-limits to non-Communists. Shanghai products include antibiotics.



Sign of China's transportation woes: hydrochloric acid ready to be shipped from Shanghai plant. Tank cars or trucks would be more efficient, but China's railroads and highways are still skimpy. Some of these kegs probably wound up on a horse-drawn wagon, still a prime transport method.

This ramshackle plant is one of hundreds of do-it-yourself plants supposedly peppering the countryside, producing chemicals ranging from sulfuric acid to PVC. This plant is on a 'People's commune', took six months to build. Capacity: ammonium sulfate, 800 tons/year; soda, 1,000 tons.



# SPECIAL REPORT RED CHINA

## China's Spotty, Inconsistent Production Record

Official sources put out conflicting figures.<sup>(1)</sup>

Product	1949	1952	1957	1958	1959	1960 Target	1962 Target
Chemical fertilizer ( <sup>000</sup> metric tons)	27	181; 194	631; <sup>(6)</sup> 755; 803	639.9; <sup>(2)</sup> 811; <sup>(6)</sup> 1,244; 800	1,330 <sup>(3)</sup>	2,800	6,000- 7,000; 15,000- 20,000
Nitrogenous fertilizers 20% N content). ( <sup>000</sup> m.t.)	—	194	683	900	1,300 <sup>(4)</sup> . 1,500	—	—
Phosphate fertilizers (18% P <sub>2</sub> O <sub>5</sub> ) ( <sup>000</sup> m.t.)	—	—	120	344	750 <sup>(4)</sup>	—	—
Sulfuric acid ( <sup>000</sup> m.t.)	40	190	611; 632	740; 749	1,050	1,500	4,500
Caustic soda ( <sup>000</sup> m.t.)	15	79	198	262.6; 270	365	—	800
Soda ash ( <sup>000</sup> m.t.)	88	192	478; 506	640	800	—	—
Antibiotics (m.t.)	—	—	—	—	—	—	1,200
Sulfa drugs ( <sup>000</sup> lbs.)	—	178.2	4,989.6	—	—	9,979.2	—
Penicillin (kg.)	0	46	18,266	72,606	—	—	—
Insecticides ( <sup>000</sup> m.t.)	—	—	—	—	—	—	135
Synthetic fibers ( <sup>000</sup> m.t.)	—	—	—	—	—	—	100
Plastics ( <sup>000</sup> m.t.)	—	—	13	—	—	—	200; 58
Salt (million m.t.)	2.99	4.95	8.28	10.40	11.04	14; 13	10-11
Coal (million m.t.)	30.98	63.53	128.62; 130	270	347.8	425	190- 210
Crude oil ( <sup>000</sup> m.t.)	122	436	1,460	—	3,700	—	5,000- 6,000
Steel (million m.t.)	0.158	1.35	5.35; 5.24	11.08 <sup>(5)</sup>	13.35	18.4	10.5- 12

1. Sources: Media of the People's Republic of China; U.S. government reports and non-government publications, both of which derive their data from official Chinese sources. Minor inconsistencies probably result from rounding. Appearance of a single figure for a given item and year does not necessarily mean that all sources are consistent, but, most often, merely that all sources do not report on all items or on the same items for the same years. Whether or not the figures are consistent, they should not be considered reliable.

2. Derived from percentile data.

3. Target: 2.05-2.25 million tons.

4. Target.

5. Only 8 million tons suitable for industrial use.

6. Probably include only nitrogenous fertilizers, exclude ammonium nitrate and phosphate fertilizers.

lion/year. Natural manure use has been expanded almost to the maximum; and the only way to feed the ballooning population will be by stepping up yields with chemical fertilizers.

China needs an estimated 20 million metric tons of fertilizer/year. Last year, production was targeted at 1.33 million tons, probably fell far short of this. In August of that year, Premier Chou-En-lai himself reported that in the first six months production had fallen short of the goal by more than 40%, and implied that the full-year goal needed trimming.

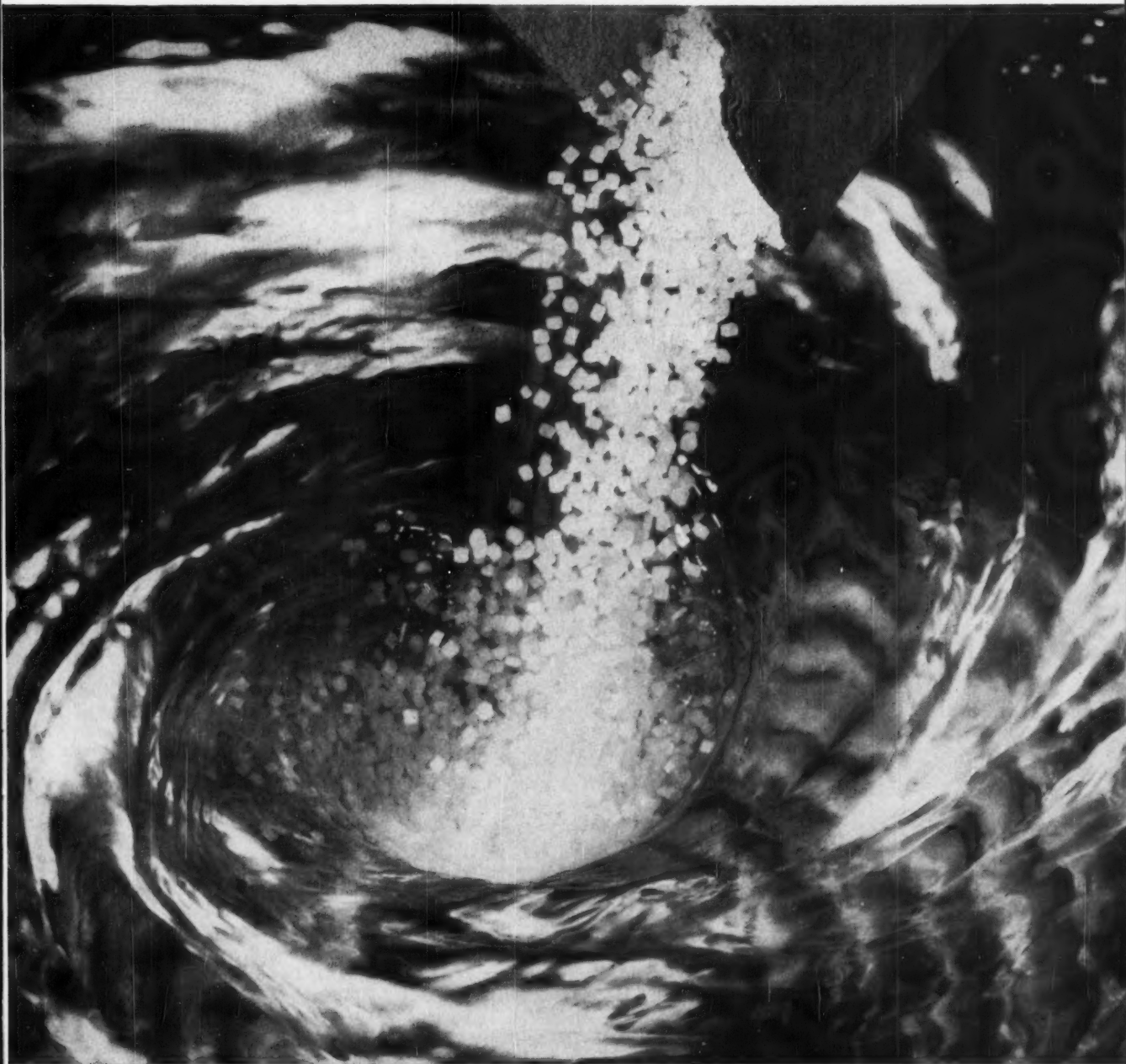
Imports have helped China make up part of its

needs. But a serious foreign exchange shortage limits this. In '58, imports rose 50%, supplied 54.1% of the claimed consumption of 2.7 million tons—which is far short of China's needs.

**Hard Buildup:** In '52, at the start of the first plan, China had only two major fertilizer plants: Dairen, with a capacity of 80,000 m.t./year of ammonium sulfate, and the Yungli plant at Nanking (63,000 m.t.). They supplied 75% of the country's ammonium sulfate production that year.

During the first plan, these plants were expanded, and construction of the five other Central-State plants

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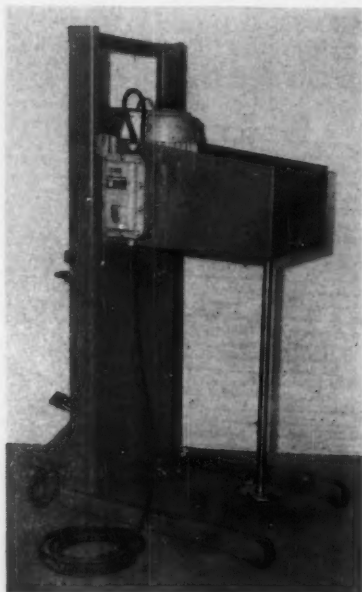
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SPECIAL REPORT

## RED CHINA

started. None came onstream before '57.

Under the second plan, formulated in '56, the '62 target for chemical fertilizers was set at 3-3.2 million tons/year. A year later this was revised to 7 million tons, including 2 million tons of phosphate fertilizers. Then, in the "great leap" clamor of '58, the Communist leaders predicted production could be boosted to fulfill about 80% of the new target in '62 by establishing a network of medium and small plants throughout the country.

So far the "great leap" has flopped dismally for fertilizers. Crimps in capital, materials, and technology make it impossible to build any more large-scale plants. The seven already existing or under construction are being completed or expanded. But the full weight of the new plan rested on the 66 medium and small projects—total capacity: 2.7 million m.t. of nitrogenous fertilizer (expressed in terms of 20% N content)—which were to have been started in '58.

On the hsien (county) level, only a few of the planned 36 ammonium bicarbonate plants were started. On the Special ch'u (municipal district) level, only two of seven planned projects were begun. At the provincial and municipal level, only about half of the planned 21 projects were being built. Except for the Anhwei calcium cyanamide plant and the Wuhan ammonium bicarbonate plant, none of the local projects was completed in '58.

Evidently, the small-plant program has been scrapped or temporarily set aside because of shortages of building materials, equipment, and technical personnel. The seven big plants are still supplying about 80% of China's total chemical fertilizer needs.

At the present rate of progress, experts say, it will take China a decade to achieve production of even half the 20 million m.t./year it needs to feed its exploding population. And this, of course, can have a vital effect on the rest of China's grandiose economic plans.

**Firm in Pharmaceuticals:** One trend that is seemingly accurately reflected in erratic patterns of China's trade with the West (*CW*, May 11, '57, p. 98)

is its "self-sufficiency" in pharmaceuticals. Pharmaceutical exports from Italy, West Germany and the U.K. were all down last year, although exports from France rose slightly, in line with an increase in all French chemical exports to China.

China is evidently supplying most of its antibiotics needs. It produces Terramycin, Aureomycin, streptomycin, penicillin, oxymycin, sulfa drugs, as well as a range of proprietary products.

Almost paradoxically, with China's increased self-sufficiency in drugs has come an unexpected drying up of its exports. Two years ago, drug dealers in Southeast Asia and even South Africa were alarmed over the influx of cut-priced Chinese drugs, some of which were actually re-exports from Europe. Now pharmaceutical exports have virtually disappeared.

**Plastics Push?** While China's pharmaceutical imports have been on the downswing, imports of plastics directly from Western Europe and through Hong Kong are on the rise, notably in polystyrene, polyethylene, polyvinyl chloride, and cellulose plastics. Volume is relatively small—only about \$1.1 million from Britain, China's biggest Western supplier. But they are apparently a sign of a quickening interest in plastics.

China's plastics industry right now is embryonic. It wasn't until late in '56 that the Party called for setting up a synthetic organic chemical industry. Since then, China claims to have developed production of the major raw materials, reagents, solvents, and processed products.

Right now, however, there are more plans than plants. With the Chinese de-emphasis on consumer products, plastics has taken a back seat, and not even plastic fabricating industries are very advanced. The primary plastic being produced now is PVC. Some phenol-formaldehyde and urea molding powders are also in production. At the end of '58, the Canton experimental polyethylene plant went onstream, using a low-pressure process believed similar to the Ziegler process. And the Chinese claim to be experimenting in plants to produce titanium and fluorine plastics, polymethylaldehyde, and ion-exchang-

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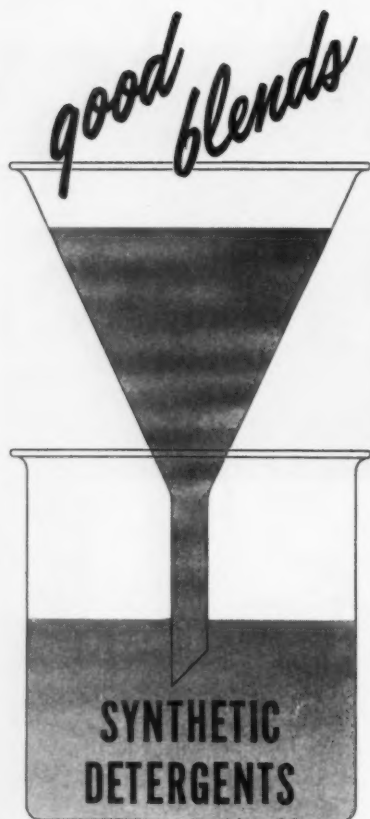
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SPECIAL REPORT

## RED CHINA

ing plastics. Output may be far off.

**New Fibers:** China's chemical fiber industry is also really just getting started. The old Antung viscose plant has been back in production for two years after its postwar reconstruction. Last year, two nylon plants went on-stream, and this summer a large troupe of East Germans started up the first stage of the "highly automated" Pao-tung viscose plant, which is to have a capacity equal to 70% of China's present output of natural silk (over 190 million meters in '58).

But the real fiber breakthrough will come when the seven-plant Shanghai complex goes into production in '62, spinning out 60,000 tons/-

In Hupeh Province alone there are said to be more than 300 small chemical plants, compared with one sulfuric plant before the '58 "leap." In many areas, assert the Chinese, what were set up as "baby" workshops two years ago are now turning out 80,000 to 90,000 tons/year of potash fertilizer—a claim that is worthy of some skepticism.

By mid-'59 Peking counted some 2,000 small sulfuric acid factories, most using the chamber process, and supposedly turning out around 80,000 tons last year. Technicians of the big Yung Li chemical works in Nanking designed simplified contact process equipment—a matter of pot-

### China's Chemical Trade with Western World—1958

	China's Imports	China's Exports
	(\$ million)	
Total	131	36
Inorganic chemicals	6	9.5
Organic chemicals	19	4.8
Dyeing, tanning, coloring products	8	—
Medicinal and pharmaceutical products	11.6	2.3
Chemical fertilizers	67	—
Synthetic plastics	3.4	—
Pigments, paints, varnish	—	2.5
Essential oils	—	5.4
Misc.	14.8	10.6 <sup>(1)</sup>

(1) May include salt.

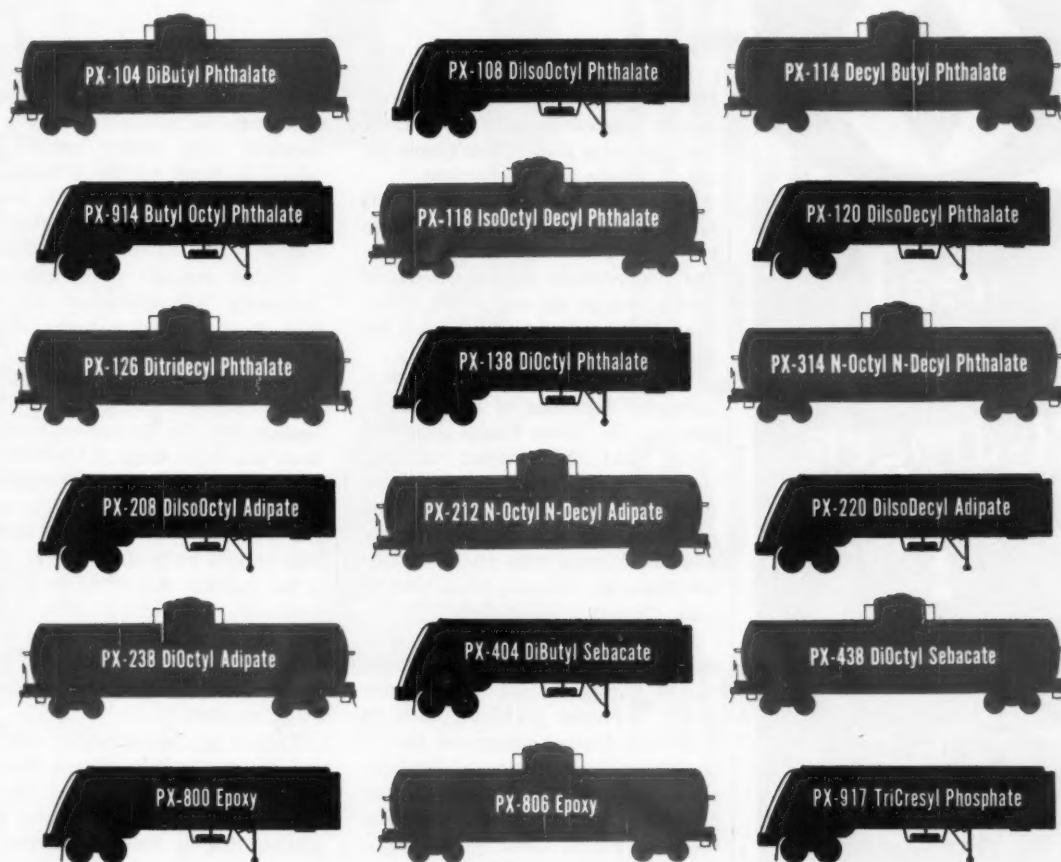
year of polyester, nylon 6 and 66 types, acetate, and artificial silk, wool and cotton.

**Backyard Bounty:** In their attempts to overcome their lack of investment capital and their handicaps in transportation, the heavy equipment industry, and materials, the Chinese planners have extended their pint-size plant program from steel (which didn't work), and fertilizers (which didn't either), to a whole range of chemicals—including sulfuric acid, soda ash, caustic soda, explosives, sulfur, insecticides, potassium nitrate, nitric acid, nitrate and potassium chlorate.

The leaders, at least, seem happy with the idea. "Every province, every county, and even many people's communes have set up chemical factories," Peking radio announced recently.

tery, oil barrels, and cast iron—which, the official drumbeaters maintain, was used to set up 40 small plants in three months in one area, each with an annual capacity of 400 tons. The Chinese claim that small-scale contact process equipment of this size can be built in 10 to 20 days at less than one-thirtieth the cost of the equipment required by a 4,000-tons/year plant, which would take six months to build.

Enthusiastic spokesmen of the Ministry of the Chemical Industry recently claimed that more than 100 chemical products—requiring a high degree of technology—can be made in small and medium-size plants by modern or simple local methods. This includes phosphate and potassium fertilizers, furfural, calcium carbide, synthetic rubber, organosilicones, epoxy



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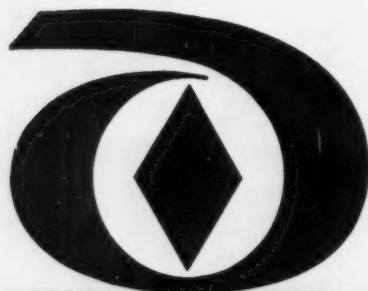
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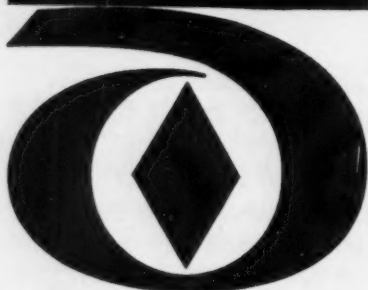
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SPECIAL REPORT

## RED CHINA

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**Aid From the West:** For all this local enthusiasm and drive, the Communist Chinese wouldn't be where they are today if they didn't have the aid of Russia and its satellites.

Not that China has received any handouts. So far as is known, Russia has given China no outright grants, and a surprisingly modest amount of credits. All of the equipment China gets from the Soviet bloc it pays for with exports.

What Russia has given China is enormous injections of technical assistance. The Soviet Union is helping China build 291 factories, including chemical plants, such as the major fertilizer works and the Lanychjou petroleum refinery. It has flooded China with more than 10,000 sets of specifications, including plans used to build 150 industrial projects.

Russian technicians, who have swarmed over China sometimes 10,000 strong, helped the Chinese master industrial problems, such as producing capital equipment like a 50,000-tons/year nitrogen fertilizer plant, and laid the groundwork for producing specific goods, including varnishes, paints, rubber goods, drugs, medicines, and "many kinds of chemicals."

Under a '58 agreement, joint Soviet-Chinese work has been launched in 16 fields of scientific and engineering problems. This includes complex utilization of coal, petroleum, and natural gas, designing new chemical machinery, research on new drugs. Moreover, 160 research and designing institutes in the two countries are working together. Thousands of Chinese students get their advanced technical training in Russia, and Russians have helped develop Chinese educational programs, along with guiding over-all economic planning.

The European satellites have helped too, in providing technical help for projects such as new fiber plants, and in supplying much of China's capital equipment needs.

**Will It Last?** The big question now is, Is this "unbreakable friendship, cooperation, and mutual aid" heading for the rocks? The increasingly open ideological clashes between Peking and Moscow have left Western ob-

servers divided on the question. The predominant view in Washington—and among Hong Kong's close-in observers—is that while serious differences exist, neither country can afford to break up the alliance, and doesn't intend to. But other government observers—U.S. and British—believe a real crisis may be at hand.

Despite Peking's proud claims to increasing self-sufficiency, a break with Russia would probably cripple China's industrialization plans.

**New Force?** Right now, China means different things to Western businessmen. To Europeans, it represents an interesting, if erratic and sometimes disappointing, market. To Americans, it is forbidden—for some it is tempting—territory. For businessmen in both parts of the world, there is the concern that while its trade is practically insignificant now, China will sooner or later be a force to be reckoned with, a politically motivated trader that will have the means to break markets.

China's precise economic relations with the Soviet bloc are not clear. It has never been committed to the division of labor and economic integration that is being developed in Eastern Europe. But Russia and China have been each other's most important allies, so government experts assume that they are basically working together in the Communist "trade and aid offensive," despite occasional signs of rivalry, in places such as Africa, the Mid-East, Cuba.

A Sino-Soviet split would change all this, and change the meaning of China for businessmen. If it produced a slowdown in China's economy, this could mean a shrinking market. But it might also mean that China would have to turn away from the Moscow-dominated Communist bloc and depend more on trade with the West—and that could mean more business.

On the other hand, a China pitted against both Russia and the West could well be more virulent than it is today. If it went out to carve an empire for itself with no holds barred, it could stir up a mighty turmoil—for international businessmen, as well as for diplomats and for soldiers.

But all this is speculation. China remains a mystery.



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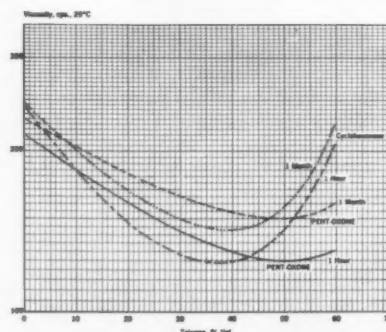
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Diacetone Alcohol	48	36
Ethyl Amyl Ketone	18	14
PENT-OXOL Solvent	30	25
PENT-OXONE Solvent	22	20

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Butyl Alcohol	5%
Indicated Solvent	50%

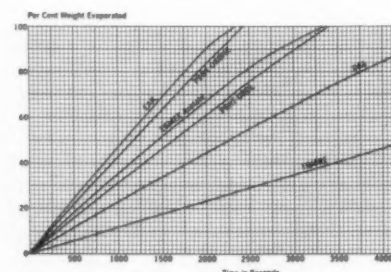
- (3) Commercially available solution reduced to 15%w with indicated solvent. Solvent consists of:

Toluene	26.5%
Indicated Solvent	73.5%

### NITROCELLULOSE SOLVENT PROPERTIES

High Boiler	Viscosity, Cps., 25°C.	Blush Resistance, % R.H., 80°F.	Dilution Ratio, Toluene
PENT-OXOL	100	93	4.7
PENT-OXONE	67	91	3.1
Diacetone Alcohol	134	82	2.3
Ethyl Amyl Ketone	74	94	2.2
Ethylene Glycol Monoethyl Ether (EGMEE) Acetate	64	91	2.5
Ethylene Glycol Monobutyl Ether (EGMBE)	105	96	3.3

<sup>1</sup>At a concentration of eight grams R.S. 1/2-second Nitrocellulose per 100 mls solvent.



Solvent Evaporation Rates

# ents for use in nitrocellulose lacquers

## PENT-OXOL

### SOLVENT

#### Description

**Pent-Oxol** is a high boiling glycol ether. Its solvency and volatility help you achieve a desirable balance of lacquer properties such as viscosity, flowout, gloss, and blush-resistance.

#### USES

**Acrylic lacquers.** Because high boiling **PENT-OXOL** gives superior gloss to acrylic films, it is a desirable choice for your acrylic formulations.

**Nitrocellulose lacquers.** **PENT-OXOL** is an outstanding blush-retarder for nitrocellulose lacquers . . . yet the prolonged evaporation time usually encountered is no problem. Its evaporation rate and good solvency make it particularly suitable for use in high-low type thinners.

**Vinyl coatings.** Preliminary data indicate that **PENT-OXOL** peptizes vinyl chloride homopolymers suggesting its use as an organosol dispersant.



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**SEE BACK PAGE FOR 22  
IMPORTANT USES**

ITIES

, water white  
or.

-OXOL  
vent

3.8--167.0°C.

0°F.

SOLUTIONS

B-66
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25
15

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solvent mixture

n reduced to  
solvent mixture

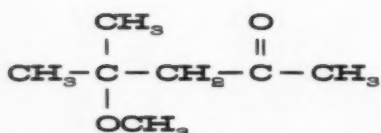
%  
%

PERTIES\*

Dilution Ratio	
Toluene "TOLU-SOL"®	
4.7	1.3
3.1	0.9
2.3	0.6
2.2	0.9
2.5	0.9
3.3	1.8
S. ½-	
solvent.	



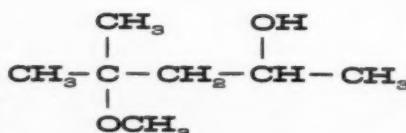
# 2 NEW HIGH BOILING SOLVENTS FROM SHELL



**PENT-OXONE\***

SOLVENT

**KETO-ETHER**



**PENT-OXOL\***

SOLVENT

**GLYCOL-ETHER**

A new chemical class of solvents incorporating  
the best qualities of ketones and glycol ethers

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**OT  
COATING**

In epoxy coating  
can be used to  
flowout, gloss a  
These two new  
setting acrylic

**22 suggested**

Aerosol vapor p  
Agricultural che  
Cellophane adhe  
Cosmetics  
Dry cleaning so  
Duplicating fluic  
Dye solvents  
Extraction and  
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Nail polish lacq  
Perfume fixative  
Printing inks, n  
Rosin soldering  
Rust removers  
(improve per

**SHELL CH  
INDUSTRIAL**

Arlanto • Chicago • Cleveland •  
IN CANADA: Chemical Division, S

# OTHER SURFACE FINISHING APPLICATIONS

coatings, PENT-OXONE and PENT-OXOL solvents  
used to balance properties such as pot life, viscosity,  
loss and flexibility.

New solvents are useful as high boilers in thermo-  
colytic formulations, vinyl-acrylics, and others.

## Recommended uses for Pent-Oxone and Pent-Oxol

as a pressure modifier  
in chemical solvents  
as adhesive solvents

in cleaning soaps (coupler), stain removers  
in fluids

in  
in and crystallization  
in and antibiotic manufacture  
in for cellulose acetate fibers

in  
in of slushing compounds  
in combustion engine cleaners  
in removers

in for cleaners  
in desizers  
in solvents  
in stickers  
in removers

in ingredients  
in (storage clarity, viscosity, stability)  
in nature brines  
in oil additives

in cleaner formulations  
in dewaxing  
in lacquers

in derivatives  
in resins, nitrocellulose and aniline types  
in drying flux solvent

in removers  
in (penetration, degreaser) ( $H_3PO_4$  type)

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# Technology Newsletter

CHEMICAL WEEK  
September 10, 1960

**Latest development in direct conversion of heat to electricity** by Bell Telephone Labs: a thermoelectric alloy made of silver, antimony and tellurium. This metal is expected to replace lead telluride and bismuth telluride, used in today's heat-to-electricity devices. Advantage: the alloy will enable more efficient thermoelectric equipment because of unusually good conductivity and electronic properties.

•  
**An 80% reduction in dental caries (decay) in young children** drinking fluoridated milk was reported at this week's Fifth International Congress on Nutrition in Washington. Louisiana State University researchers, after a 4½-year study, recommend large-scale studies of the prophylaxis. Homogenized milk containing 1 mg. of sodium fluoride/-half-pint container was given the children during school lunch. (They found no difference in its taste, color, or odor, compared with untreated milk.) The method is of potential value in areas where municipal water supplies are not fluoridated, the investigators believe.

•  
**A radically new process for making aluminum** will soon get commercial tryout in an 8,000-tons/year Aluminium Ltd., plant in Arivida, Que. This plant will be completed in about two years, will require a \$4-million investment—about that of a conventional Hall process plant of the same size. Although there is no saving in the large power usage, other operating cost reductions provide additional incentive for new plants to switch to this process. (Even though there is a current oversupply, additional capacity will likely be needed within the next two years.)

A recent French patent (1,210,068) describes the process: half the aluminum content in bauxite—the usual ore—is electrically reduced to metal. This partly converted mass is then treated with aluminum trichloride, at 1000 C to get aluminum monochloride. Impurities in this compound are removed as the vapors flow into a condenser. The vapors are cooled as they pass over a violently agitated pool of molten aluminum. As the temperature drops, both metallic aluminum and trichloride are formed. The trichloride is recycled while product aluminum is continuously tapped from the molten pool.

•  
**A high-temperature wind tunnel that doubles as a chemical reactor or metals furnace** has been developed by Westinghouse Electric Corp. (Pittsburgh). The tunnel, primarily designed for missile testing, has an electric arc heater and is potentially capable of supplying an air or nitrogen stream at up to 15,000 psi. and 20,000 F, Westinghouse says. It can be used for making nitrous oxide or in petroleum processing, according to John Hutcheson, vice-president in charge of engineering.

Features include low contamination of the gas and uniform temperature "profile" within the heat chamber. (Burning electrodes and

## Technology

### Newsletter

(Continued)

chamber walls in other types of development units contributed as much as 10% impurities to gas flowing through the system.) Hutcheson says the new unit has a "guaranteed maximum contamination level of 0.2%" and that "further reductions in this level are contemplated." Cost of the unit (depending on requirements): \$500,000 to \$1.5 million.

**Polypropylene production by a new "spark discharge" process** has just been started in a 1-ton/day pilot plant run by Tokuyama Soda (Yamaguchi Prefecture, Japan). The firm, which has completed two of five patent applications, is planning to build a 10,000-tons/year plant early next year. The process (*CW*, Aug 27, p. 87) uses a special metallic halide catalyst with an electric spark as an initiator. Gaseous propylene and propane, passed through a continuous high-voltage arc, then washed and dehydrated, polymerizes with an average molecular weight of 500,000 and a melting point of about 330 F.

**Two new ways to give crop mutants make news this week:** Rohm & Haas has registered Australian patent application 56,880/60 for producing hybrid tomato seed by treatment with a polyvalent metal salt of 2,23-dichloroisobutyric acid. And University of California (Davis) viticulturist Harold Olmo has used X-ray irradiation (2,500 roentgens) of grape vines to produce loose clusters of grapes that need not be hand-thinned.

**Slurry fuels for ramjet engines** (e.g., the air-breathing Talos) will be developed under a new Air Force contract with Atlantic Research Corp. (Alexandria, Va.). ARC has a leg in the field with its Arcogel slurries (marketed with Thompson Ramo Wooldridge) used as rocket propellants. The latter are typically composed of kerosene, a gelling agent, and a perchlorate oxidizer.

There's not much competition—and not a very large market—in the slurry fuel field yet. But the slurry fuels are of interest because they represent a compromise between solids and liquids. Denser than liquids, they pack more fuel per unit volume, require only one chamber (instead of two for, say, LOX and kerosene). Unlike solids, they can be pumped for throttling. ARC will be investigating slurries that consist of an organic liquid fuel and a solid oxidizer. Particle size and shape of the oxidizer must be carefully controlled, ARC tells *CHEMICAL WEEK*.

**The CPI is studying the use of light-wall carbon steel pipe**, which might save as much as \$6 million (or about 10%) on its piping bill. Most of the piping dollar now goes for ordinary heavy-wall product. But there is already a definite trend to the use of light-wall stainless steel piping (*CW*, Oct. 25, '58, p. 51). The trend has been slower in coming for carbon steel. Specifications for this type of piping have been lacking, especially for small diameters, and the pipe has been difficult to buy.

# ***AN IMPORTANT NOTICE***

## ***TO READERS NOT SUBSCRIBING***

### ***TO CHEMICAL WEEK NOW***

You are undoubtedly familiar with the **CHEMICAL WEEK BUYERS' GUIDE ISSUE** received by **CHEMICAL WEEK** subscribers each year as part of service. Well, the 1961 edition of this 750-page volume is just about ready to go to press and will be mailed to current subscribers on September 24th.

Now, sure enough, as soon as this issue appears, we'll get a virtual avalanche of requests from non-subscribers desiring to purchase a copy. *It happens every time this unique buying aid comes out.*

Much as we dislike having to turn down such requests, we must explain that the **BUYERS' GUIDE** is distributed to **CHEMICAL WEEK** subscribers only and is *not available for sale at any price today.*

So, if you would like a copy and are not currently a subscriber, why not avoid disappointment by entering your subscription to **CHEMICAL WEEK** *now*. All you need do is fill in the attached order card which entitles you to receive the 1961 **BUYERS' GUIDE ISSUE**, as well as the next 156 weekly issues of **CHEMICAL WEEK** for only \$5 (or 52 issues for \$3, if you prefer).

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The 1961 **BUYERS' GUIDE ISSUE** actually contains 10 up-to-the-minute directories in one huge volume . . . over 9,000 items of chemicals, equipment, raw materials and services . . . listed by product, company and trade name—*more than 170,000 listings* in all. Within these pages are all the answers to your source of supply questions.

Since you are now reading this copy of **CHEMICAL WEEK**, you already know what a top-notch bargain this weekly magazine is by itself (little more than 3¢ per issue at the three year rate). We don't see how you can pass up the chance of having your own copy—fresh, fully-intact and “when you want it”—delivered every week of the year to your home or office—*at such insignificant cost to you.*

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## **CHEMICAL WEEK**

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## BAKER PROCESSING CHEMICALS...

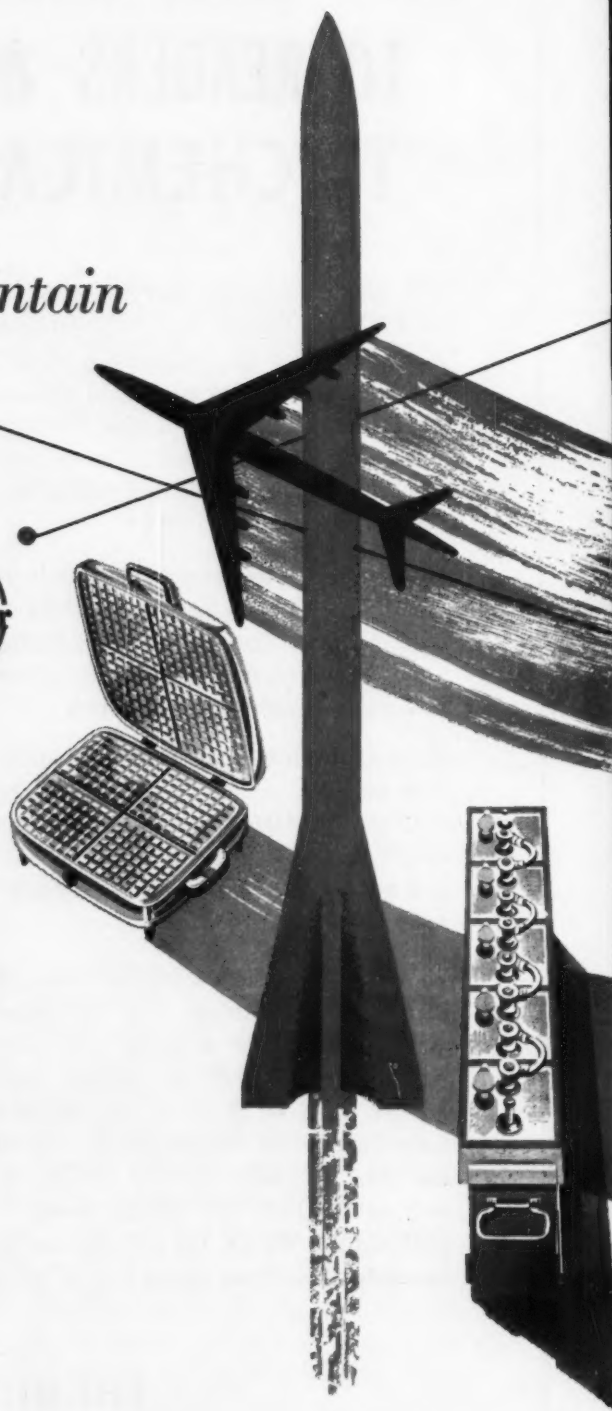
*"...Baker repeatedly  
supplies us high quality  
bulk chemicals...to maintain  
product quality  
...and reduce costs."*

The remarkable success story of Thomas A. Edison Industries is without question due in part to their strict practice of the motto, "There's a better way to do it . . . find it." And — as they point out in their letter — Baker Chemicals help them do just that.

Thomas A. Edison is still another example of today's industries that provide precision products for industry, defense and the home. They demand and depend on high quality processing chemicals. They have found a consistent, reliable source of supply in J. T. Baker.

Now more than ever before, so many leading manufacturers find they benefit substantially by the economies provided by Baker Chemicals. Many time and labor consuming operations can be minimized or completely eliminated as a result of J. T. Baker's ability to adhere to the most stringent specifications.

No matter what your industry or product, key chemicals of dependable uniformity and purity, in tonnage quantities, can often open new doors to smoother, more economical operations. You too will find that it pays to follow the leaders and specify Baker Chemicals. You can be sure we will always consider your trademark as precious as our own.



**J. T. Baker Chemical Co.**

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PURITY BY THE TON—FOR

one of the guardians of this precious trademark



**THOMAS A. EDISON INDUSTRIES**

West Orange, New Jersey

INSTRUMENT DIVISION

Orange 3-6800



November 10, 1959

Mr. Warren F. Schumacher  
General Sales Manager  
J. T. Baker Chemical Co.  
Phillipsburg, New Jersey

Dear Mr. Schumacher:

"There's a way to do it better -- find it." -- That's our motto and we feel that Baker chemicals help us to do just that.

For many years we have relied on the high purity of Baker reagents in our laboratory work. In making the transition from the development stage to full plant production, one of our products required bulk quantities of the same high quality materials that were used in the laboratory.

The J. T. Baker Chemical Co. has repeatedly supplied us these high quality bulk chemicals. By minimizing the variables we have been able to maintain the quality of our product and at the same time reduce costs.

Your high standard of personalized service and cooperation, both at the purchasing level and in our plant, is also to be commended -- all these factors we feel are vitally necessary to help protect our precious trademark and keep our motto in practice.

Sincerely yours,

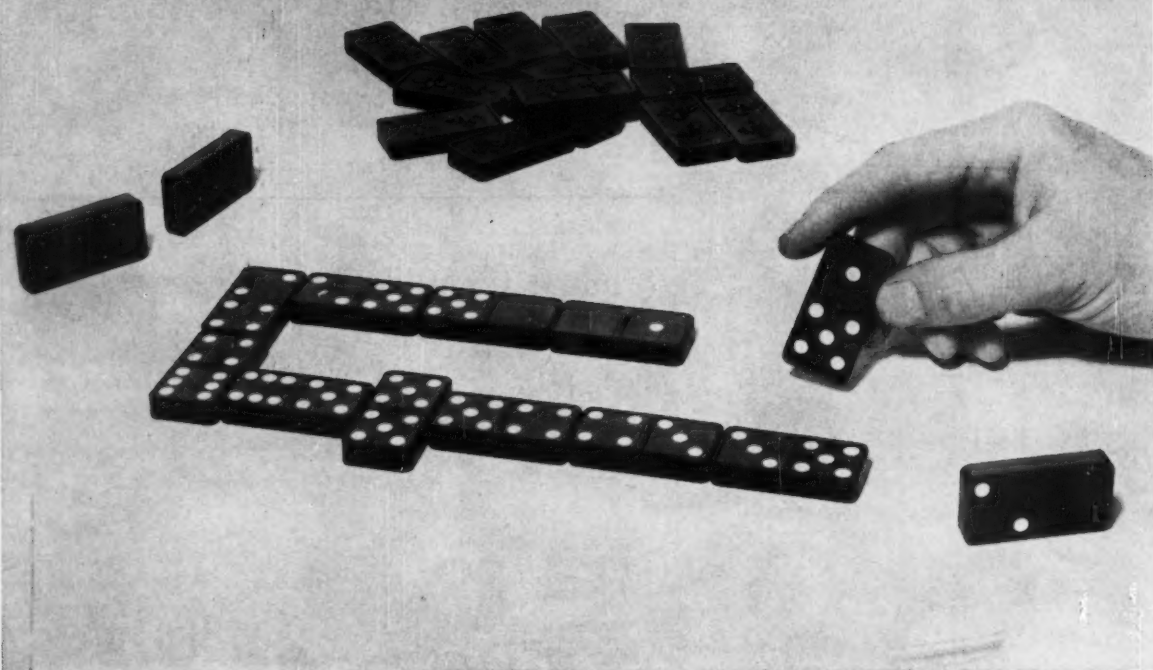
THOMAS A. EDISON INDUSTRIES  
Instrument Division

*John J. Dietz*  
John J. Dietz  
Chief Engineer

JJD/hma

**PRODUCTION USE**

# It's your move!



**PROBLEM:** Playing dominoes, you set the 5-3 bone. Your opponent matches 3-4 and play alternates 4-5, 5-5, 5-6, 6-4, 4-2, 2-5, 5-0, and 0-1. Now it's your turn, you have a 5-1 bone, and one play wins the game for you. Where do you match?

## ANSWER

Matching five against five (at bottom or either side of spinner) keeps the game open and your opponent can still play. However, matching one against one (top) makes all ends open only to five. And, counting, you know all fives have been played except the one you hold. So matching 1-5 you win by freezing the game, forcing your opponent to draw the entire boneyard.

**W**YANDOTTE'S NEW GEISMAR WORKS, just south of Baton Rouge, Louisiana, has a daily capacity of 300 tons of chlorine, 330 tons of caustic. This new facility firmly establishes us as a multi-plant producer and supplier of chlorine and caustic soda . . . as well as ethylene oxide-glycol and related products.

**It's your move now!** By railway, highway, inland or oceangoing water transportation, Wyandotte products are now directly accessible to four-fifths of the productive capacity of the United States and Canada. "Over-the-fence" supply is an interesting possibility if you build on or near our 1200-acre site.

Find out how helpful Wyandotte can be. Write us today for more information . . . or a get-together. Wyandotte Chemicals Corporation, Dept. 728-W, Wyandotte, Michigan. Offices in principal cities.

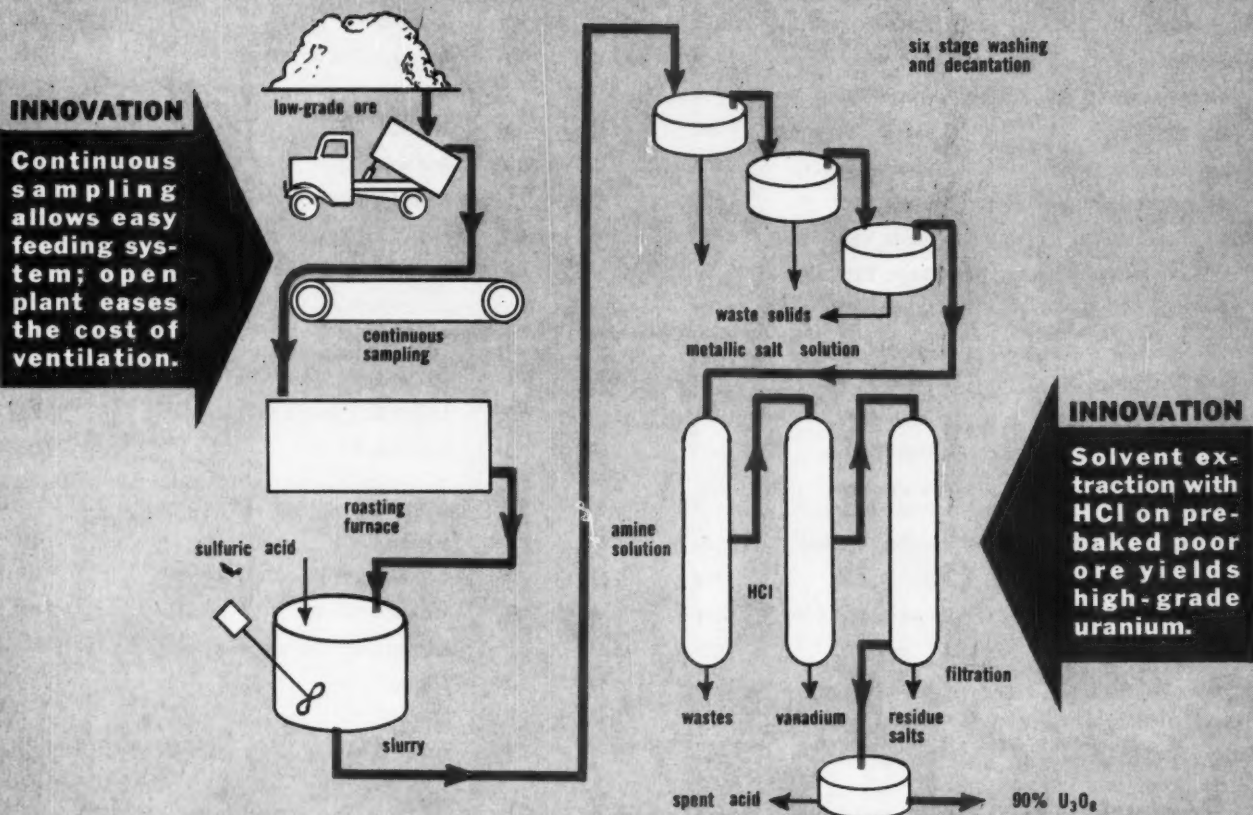


## Wyandotte CHEMICALS

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## How New Process Extracts High-Grade Uranium from Texas Ore



## Behind Uranium Makers New Optimism

The uranium industry is moving with renewed vigor this week, and improved processing techniques are making a big contribution to the optimistic new attitude. Susquehanna-Western, Inc.'s (Denver) plans for a \$2-million plant in Texas (*CW*, Aug. 6, p. 17), for example, are based on refined know-how. Moreover, improvements will help companies weather the market drought that may come between expiration of government contracts (1964 or '66) and big private purchases (perhaps '70).

The buying gap for uranium may not materialize, of course; the Atomic Energy Commission, whose contracts

have backed all uranium plants built so far, is already extending some contracts beyond '64. Just last month, it lengthened its contract with Petromics Co. (Oklahoma City) to '66. And AEC is still trying to line up 800 tons/day of additional uranium refining capacity.

But if the contracts aren't extended beyond '64 or '66, most processors may be in trouble. All use relatively standard techniques, tailored for their own ores or geographical location. Under AEC's accelerated amortization plan, which runs out in '62, cost of most of their plants will be written off. But only the most efficient—and

Susquehanna-Western is plainly counting on being one of these—will be able to bridge the gap until the private markets are likely to mature. Susquehanna besides being a late-comer, is also opening a new uranium area—around Falls City, Tex.

**S-W's Gamble:** Susquehanna-Western figures its plant, due in operation in 10 months, can process the low-grade Texas ore and still get a return on its investment before the AEC contract runs out. Also, according to Allen Gray, president of S-W, "The inevitable markets for uranium could very well materialize sooner than many people think. Our new plant is

## Uranium Concentrate Producers Selling to AEC

Company	Location	Rated Capacity (tons/day of ore)	Mill Cost (est. million dollars)	Investment (thousand dollars/ton of capacity)	Type of Process	Contract Ends
Anaconda Co.	Grants, N.M.	3,000	\$19.36	\$ 5.5	Two plants: alkaline leach-caustic precipitation and acid leach, RIP	Dec. 31, '66
Climax Uranium Co.	Grand Junction, Colo.	330	3.09	9.4	Acid leach, CCD, SX	July 31, '60
Cotter Corp.	Canon City, Colo.	200	1.80	9.0	(unavailable)	Feb. 28, '65
Dawn Mining Co.	Ford, Wash.	400	3.10	7.8	Acid leach, CCD, ion exchange	Dec. 31, '66
Federal-Radorock-Gas Hills Partners	Fremont County, Wyo.	520	3.37	6.5	Alkaline leach, RIP	Dec. 31, '66
Globe Mining Co.	Natrona County, Wyo.	490	3.10	6.3	Acid leach, RIP	Dec. 31, '66
Gunnison Mining Co.	Gunnison, Colo.	200	2.03	10.2	Acid leach, SX	Dec. 31, '62
Homestake-New Mexico Partners	Grants, N.M.	750	5.33	7.1	Alkaline leach, caustic precipitation	Mar. 31, '62
Homestake-Sapin Partners	Grants, N.M.	1,500	9.00	6.0	Alkaline leach, caustic precipitation	Dec. 31, '66
Kermac Nuclear Fuels Corp.	Grants, N.M.	3,300	16.00	4.9	Acid leach, SX	Dec. 31, '66
Kerr-McGee Oil Industries	Shiprock, N.M.	300	3.16	10.5	Acid leach, SX	June 30, '65
Lakeview Mining Co.	Lakeview, Ore.	210	2.60	12.4	Acid leach, SX	Nov. 30, '63
Mines Development, Inc.	Edgemont, S.D.	400	1.90	4.8	Acid leach, RIP, SX	Mar. 31, '62
Phillips Petroleum Co.	Grants, N.M.	1,725	9.50	5.5	Alkaline leach, caustic precipitation	Dec. 31, '66
Rare Metals Corp. of America	Tuba City, Ariz.	300	3.60	12.0	Acid leach, RIP	Mar. 31, '62
Susquehanna-Western, Inc.	Riverton, Wyo. Falls City, Tex.	500 220	3.50 2.00	7.0 9.1	Two systems: acid leach, SX and alkaline leach Acid leach, SX	Oct. 31, '63 Dec. 31, '66
Texas-Zinc Minerals Corp.	Mexican Hat, Utah	1,000	7.00	7.0	Acid leach, SX	Dec. 31, '66
Trace Elements Co.	Maybell, Colo.	300	2.21	7.4	Acid leach, RIP	Mar. 31, '62
Union Carbide Nuclear Co.	Rifle, Colo.	1,000	8.50	8.5	Acid leach, CCD, SX	Mar. 31, '62
Union Carbide Nuclear Co.	Uravan, Colo.	1,000	5.00	5.0	Acid leach, CCD, ion exchange	Mar. 31, '62
Uranium Reduction Co.	Moab, Colo.	1,500	11.17	7.4	Acid leach, RIP	Dec. 31, '66
Utah Construction and Mining Co.	Fremont County, Wyo.	980	6.90	7.0	Acid leach, CCD, ion exchange	Dec. 31, '66
Vanadium Corp. of America	Durango, Colo.	750	0.81	1.1	Acid leach, alkaline leach, SX, chemical precipitation, reduction fusion	Mar. 31, '62
Vitro Chemical Co.	Salt Lake City, Utah	600	5.50	9.1	Acid leach, SX	Mar. 31, '62
Western Nuclear, Inc.	Jeffrey City, Wyo.	845	4.30	5.1	Acid leach, RIP	Dec. 31, '66
Totals		22,320	\$143.82	6.4		

Abbreviations used: CCD, countercurrent decantation; SX, solvent extraction; RIP, resin-in-pulp.

designed to take advantage of private markets as well as AEC current needs."

S-W's mill will process 220 tons/-day of bentonitic ore (high percentage clay and slime) from just south of San Antonio, Tex. The new facility features: (1) investment reduction through semi-open plant design; plant has a partial roof, and full roof and sidewalls are only for offices and laboratory; (2) simplified ore-sampling and feeding facilities; and (3), an improved uranium extraction process that will yield a higher-grade concentrate from a lower-grade ore.

Majority of milling plant components can be outside because of the favorable Southern weather (most oil refineries in the South are built this way). This lowers investment costs, provides simpler ventilation and dust control, which is a problem in ore-milling plants.

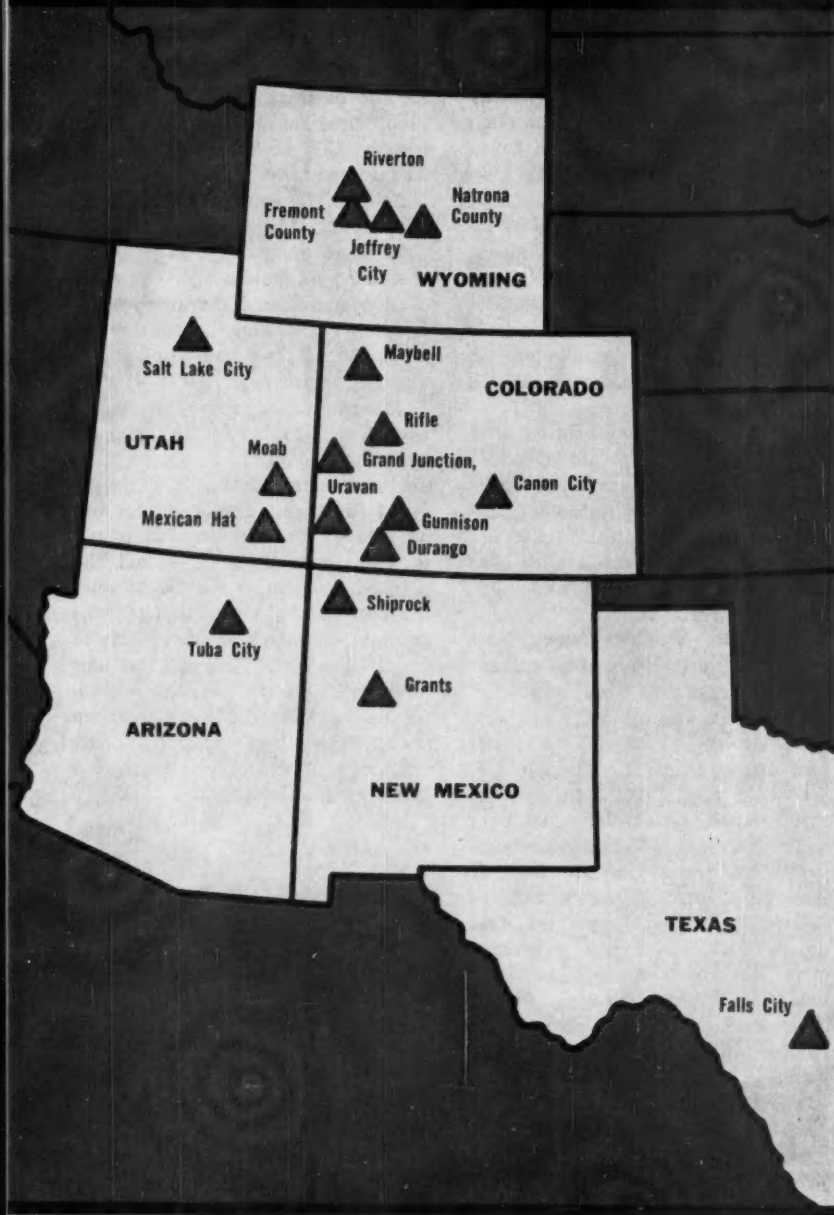
**Streamlined Start:** S-W's improved technology begins with a new simplified sampling technique. A 1-lb. ore sample is cut out of each ton of bulk ore as it is continuously fed to the process. This contrasts with the batch sampling of truck deliveries at other plants. The ore sample is con-

veyed to a 2-3-ton surge bin, much smaller than the 200-ton bin common in plants this size.

The process for making uranium concentrate ("yellow cake") brings together conventional techniques, such as salt roasting and solvent extraction, in a unique system. The ore is ground and roasted, then leached or dissolved out with sulfuric acid. The acid dissolves metallic components, and forms a slurry of metallic-uranium salt solution and insoluble solids. This slurry undergoes a six-stage counter-current decantation and washing operation to remove solids.

## Uranium industry Pushes Into Texas

ENGINEERING



Uranium is separated from the salt solution by solvent extraction. The solution is first mixed with a liquid amine, which picks up the dissolved uranium and metallic salts, carries them through the purification steps. Next, 10% sulfuric acid is mixed with the amine to extract iron and vanadium. (The vanadium may be recovered if quantities prove worthwhile.) Then hydrochloric acid is used to pull out uranium, leaving molybdenum impurities in the amine.

Finally, the uranium in the hydrochloric acid is precipitated with ammonia as a yellow powder, which is fil-

tered in a continuous vacuum filter and dried on a travelling stainless steel belt, which carries the powder under infrared lights. Concentrated yellow cake thus obtained is an ammonium-uranium compound containing 90%  $U_3O_8$ . Industry's typical yellow cake averages 80%  $U_3O_8$ .

**Variety of Systems:** The two-phase scheme used in Susquehanna-Western's operations—leaching the uranium from the ore, then extracting the valuable component — is essentially like the techniques used in all other plants. Variations depend upon the nature of the ore.

Leaching is done in either an alkaline or acid process, usually after the ore has been ground and roasted. Alkaline leaching is suitable only for ores of high lime content found near Grants, N. M. This way of leaching has three main advantages over acid leaching: it is more selective, minimizes corrosion problems, and gives a solution that is more easily "extracted."

An example of a tailored leaching technique: Rare Metals Corp. of America (Tuba City, Ariz.), in an effort to overcome the dangers of deep mining, tried to force acid 1,000 ft. underground to leach and the uranium, then pump the solution back to the surface. The acid seeped away, however, through the unpredictable sandstone faults and the project had to be abandoned.

After leaching, the solution is extracted by one of four basic methods: (1) solvent extraction; (2) ion extraction; (3) a resin-in-pulp process; or (4) precipitation by phosphate, special chemicals or caustic.

- **Solvent extraction** is the procedure to be used at Susquehanna-Western's new plant. Except for its use of hydrochloric acid, its special system (leached sulfuric acid solution extracted with an amine from which hydrochloric acid removes the uranium) is typical. This process, long used in chemical process industries, broke into uranium processing (*CW*, Nov. 8, '58, p. 67) to cut costly steps in processing high-vanadium-content ores. The system worked well and proved its versatility by being incorporated into several plants (see chart).

- **Ion exchange extraction** takes uranium out of the leached acid solution in a batch operation (a roadblock to continuous processing). The acid-leached solution is allowed to percolate through a series of stationary beds of ion exchange material, usually synthetic resins. The operation goes in two cycles. In the first, predetermined volumes of solution are fed into a bed and allowed to remain until the resin is loaded with uranium. Then the solution is advanced to the next bed in the series. In the following cycle, uranium saturated resin is first washed with water and then bathed with an eluant; chloride or nitrate ions in the eluant exchange places with the uranium. Final step is to precipitate uranium from the eluting

# Siteseeing Mid-America by Telephone



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solution with ammonia or magnesia.

- *The resin-in-pulp process* is one adaptation of ion exchange. Instead of putting a leached solution through a stationary bed, the resin, in banks of baskets, is moved through the solution. The resin picks up the uranium from the solution and then gives up the uranium to an eluting solution—in this case, ammonium nitrate or sulfuric acid. This process does not require the clear solution that ion exchange needs; also, resin-in-pulp is usually required for ores with difficult filtering characteristics.

- *In phosphate precipitation*, iron or aluminum turnings are added to the leached solution to promote formation of uranous phosphate (phosphorus is either present in the ore or is added as phosphoric acid). The uranous phosphate is filtered, upgraded by treatment with a hot caustic solution. Further caustic and cyanide washing, followed by conventional filtration and drying yields the yellow cake. This system works best when considerable phosphorus is present in the ore. Vitro Uranium Co. (Salt Lake City, Utah) switched from this method to solvent extraction, however, when phosphorus impurities in the ore stopped appearing in large quantities.

**Uranium Mining:** Open-pit mining is usually much less expensive because more economical equipment can be used, less digging is required to reach the deposit; also, there is less potential danger from radiation exposure and mining operations.

The mined ore is classified into 27 AEC categories according to the difficulty of uranium extraction. Principal metallurgical types are carnotite, asphaltic ore and uranite. They are rated according to their percentage of: four-valent uranium, six-valent uranium, vanadium, carbonaceous or asphaltic material, lime, gypsum, and primary slimes (coarse sands). Careful testing of ore composition is essential to determine appropriate processing.

**Technique Helps:** Prospects for mining the 55 million tons of proved ore in the Grants, N. M., area were doubtful until recently. Problem: ore is in soft, cave-in-susceptible rock. Also, the reserves are at depths ranging from 350 ft. to almost 1,500 ft., and water at 350 ft. to 550 ft. threatened to flood the mines. Solution: extensive use of wire mesh and

wooden beams in very narrow, carefully surveyed tunnels. At this mine, the use of track vehicles instead of rubber-tired loaders is expected to cut costs by 50% because of lower maintenance and fewer parts replacements.

At the Homestake-Sapin Partners (Grants, N. M.) mine, 13 gal. of water were pumped for each ton of ore mined six months ago. More efficient operation and the development of specific know-how has cut this water to 3 gal./ton and boosted the tons/day mined from 150 to 450.


These advances in mining plus the new system to be demonstrated by Susquehanna-Western are strengthening the uranium industry. What the demand for uranium concentrates will be between '66 and the '70s is still the big question. Also, should the political situation in the Congo alter the availability of Congo uranium, the uranium industry's market will be greatly changed. Although, at this time, nothing is definite, the outlook for the uranium industry shapes up strong through '66. After that, success would depend on how much of a boom private industry can build.

## Paint Resins

Enjay Chemical Co. launched its Buton paint resins commercially last week, its second major entry into petroplastics. Process for the novel resins is new evidence of control of stereospecific polymer molecules (CW, July 23, p. 35).

The Buton resins are copolymers of butadiene and styrene, that are offered as bases for paints or enamels. Although they are not recommended for surfaces exposed to sunlight, they exhibit an impressive list of properties when baked or hardened by direct flame. They are hard (about 50 Sward) and tough; they adhere to metals, wood and ceramics; and they are resistant to practically all chemicals except strong oxidizing acids.

**How They Are Made:** Enjay has simultaneously brought onstream two plants to manufacture the Butons—one in Baton Rouge, La., and another in Bayonne, N. J. Their total capacity is said to be 10 million lbs./year, but it is also termed "expandable," indicating that initial products will be used to develop markets. Current prices in tank-car lots are 35¢/lb. for Buton 100, 24¢/lb. for Buton 200



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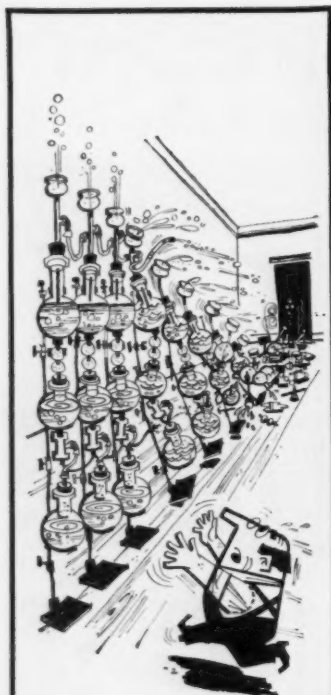
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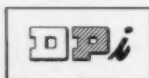
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and 22¢/lb. for Buton 300.

Although full details of the process weren't disclosed, there is enough to show that the Buton 100 process is typical of most elastomer processes, resembling the front end of a solvent rubber plant (*CW*, Aug. 20, p. 62).

Butadiene, styrene, diluent and a catalyst are fed together into a series of agitated reactors, where they are maintained at temperature by circulating a coolant, which removes the heat of the polymerization reaction. From the reactors, they flow through a stabilizer and a filter, where the catalyst is removed, to a stripping tower, which cuts out the diluent for recycle to the reactors. Buton 100 leaving the bottom of the stripper tower is pumped either to drum filling or to tank-car loading.

While the Buton 100 process is continuous, manufacture of Buton 200 and Buton 300 is by batch. Buton 100 is fed to a reactor along with undisclosed modifiers and solvents. From the reactor, the mixture flows to a modifier tank, where the polymerization forming Buton 200 or 300 is completed. The polymer then passes through a stripper, to remove solvent, and a filter to drum or tank car.

Although petroleum-based resins such as Butons offer a range of attractive possibilities, they will have to prove themselves against chemical-derived resins such as the polypropylene-urethane copolymers developed by Delka Research Corp. (*CW*, *Technology Newsletter*, Aug. 13) as well as plasticized polyvinyl chloride and DuPont's Hypalon. Most of these new coatings have complimentary properties, so that a period of market development can be expected before the optimum uses of each are decided.

## Liquid Hydrogen

The first privately owned and operated liquid hydrogen plant—designed and built by Linde Co., division of Union Carbide—is now reaching full operation at Torrance, Calif. The plant will supply the needs of National Aeronautics and Space Administration (*CW*, Jan. 23, p. 25); it has an actual capacity of 6.5 tons/day—slightly greater than the 5 tons/day contracted for by NASA.

The process at Torrance starts with the purification of hydrogen gas stream from an adjacent Union Car-

bide petrochemical plant. The hydrogen is purified, then compressed and refrigerated by liquid nitrogen. Cold hydrogen gas is then compressed further and liquefied by a combination of expansion engine and expansion valve operations.

Unstable orthohydrogen prevalent in the feed gases is converted into the para form in two stages of catalytic conversion (one before and one after liquefaction). This stabilizes the liquid product, making possible low-temperature storage in superinsulated spherical storage tanks, where evaporation losses are held to less than 0.2% /day.

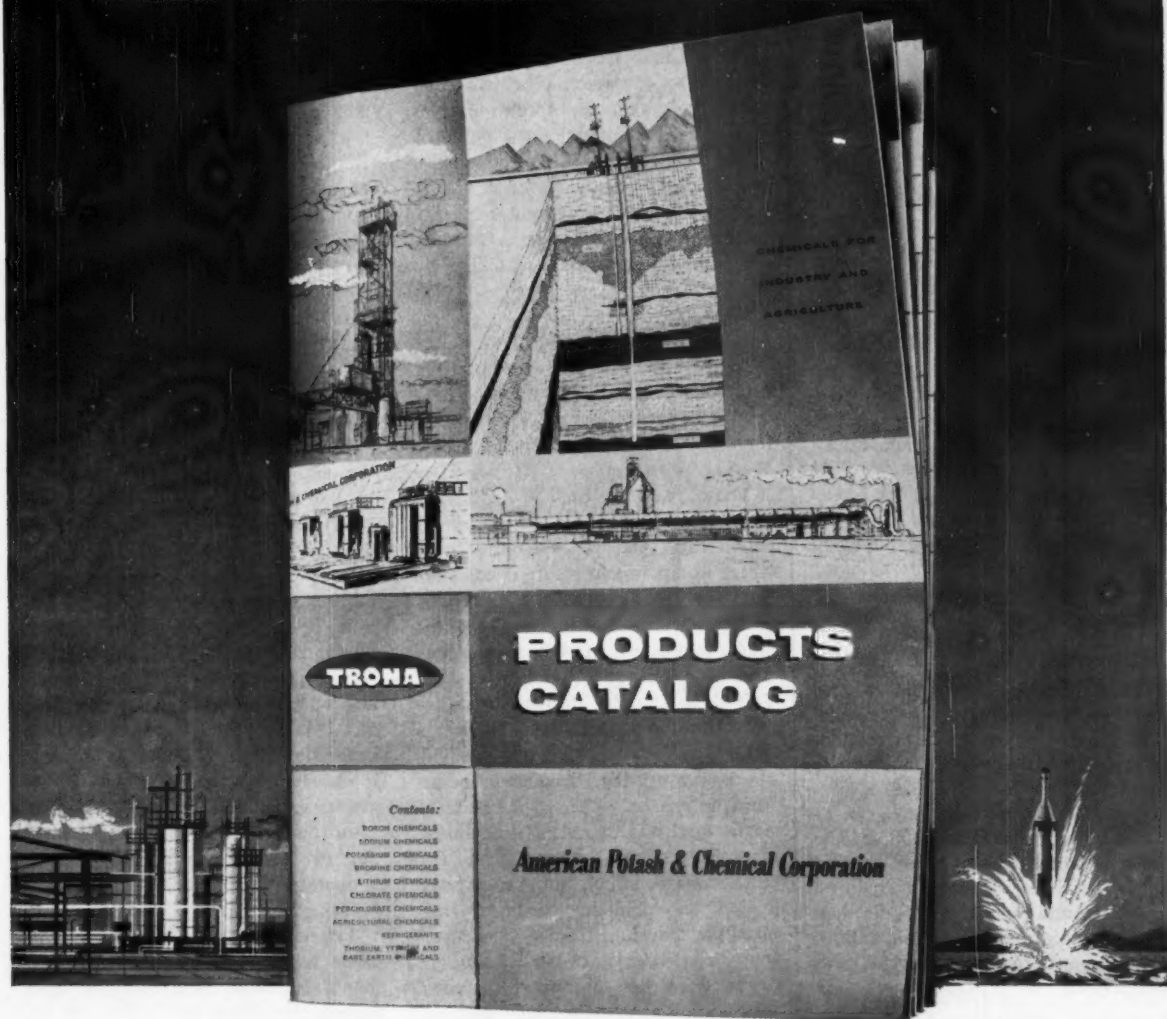
Although NASA's missile development projects still represent the only large-scale demand for liquid hydrogen, Linde expects its new plant to stimulate further industrial applications. Meanwhile, NASA is boosting its requirements for liquid hydrogen, will need from 8-10 million lbs. of hydrogen annually (*CW*, *Washington Newsletter*, July 30). This is about three times as much as Linde's plant can turn out. NASA is now talking with private companies about having a huge hydrogen plant built to supply its additional needs.

## PROCESSES

**Carbon Tetrachloride:** Chemische Werks Huels (Recklinghausen, Germany) has developed a process claimed to give better than 70% carbon tetrachloride yields, along with 20% perchlorethylene plus hexachlorobenzene and hexachlorethane by-products. A five-to-one mixture of chlorine and methane is fed through two reaction tubes. In the first reactor, the mixture is ignited with a hydrogen flame, and the temperature kept at 1200 F by regulating the gas speed and volume ratio. A heat exchanger cools the gases to 840 F before they enter the second reactor, where more methane is added. If ethylene is substituted for methane in the feed, perchlorethylene is the main product, while by-products are carbon tetrachloride, hexachlorobutadiene, hexachlorethane and hexachlorobenzene.

**Color Control:** Engineers at Monsanto Chemical's Plastics Division (Springfield, Mass.) have found they can cut delivery times on styrene molding compounds 75% by inserting

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# NEW GRADES OF DIMER ACID OFFERED BY EMERY

Two new grades of dimer acid, Empol 1024 and Empol 1014, are now on full commercial production basis at Emery Industries, joining Emery's current commercial dimer Empol 1022 (approximately 75% dimer acid, 22% trimer acid, 3% monobasic). Empol 1024 contains approximately 75% dimer acid and 24% trimer acid. Empol 1014 is 95% dimer acid and 4% trimer acid, making possible the building of long molecules with little cross-linking because of its low trimer acid content. Both contain less than 1% monobasic.

## PRICE REDUCTIONS

These new grades have been reduced in price upon attaining commercial status. Empol 1024 has been reduced to 26¢ a pound delivered in tankcar lots east of the Mississippi. This is 1/2¢ below its price when in the development stage, designated as Emery 3065-S. The other new grade, Empol 1014 (the 95% dimer) has been substantially reduced to 35¢ a pound compared to its development price tag of 45¢-47¢. It supersedes development products Emery 3019-S and 3079-S.

## CHEMICAL COMPOSITION

Dimer acid is a  $C_{36}$  aliphatic dicarboxylic acid which reacts somewhat like a long-chain member of the adipic-azelaic-sebacic acid series. Trimer acid is its tribasic acid counterpart, being a  $C_{54}$  tricarboxylic acid. Commercial dimer is a mixture of dimer and trimer acids and a small amount of unpolymerized  $C_{18}$  fatty acid.

Although some of dimer's uses depend on its unusual liquid nature, most involve reactions with the carboxyl groups, either monomeric in the case of soaps and esters or polymeric in polyesters and polyamides.

Further information on both new grades, Empol 1014 and 1024, is available in Technical Bulletin No. 418 from Emery Industries, Inc., Dept. I-9, Carew Tower, Cincinnati 2, Ohio.

continuous color control into their processing scheme. Key to their operation is a General Electric recording spectrophotometer working with a Davidson and Hemmendinger colorant mixture computer. When a special color is desired, the spectrophotometer is used to measure the color of a sample, automatically producing a graph of reflectance versus wave length. This lets the computer quickly calculate the formula for a production run, sidesteps slow matching by eye.

**Iodine Isotopes:** Abbott Laboratories (Chicago) is using high-neutron flux reactors to make its new iodine-131, the first chemical-grade isotope offered by a private producer (*CW, Market Newsletter, Sept. 3*).

These reactors, built by GE and Westinghouse, are used to step up reaction rates and yields to the point where isotope manufacture is economical. The starting material is tellurium-130. Charges containing about 50 grams of this are irradiated with neutrons and changed to tellurium-131. This then degrades through beta disintegration to iodine-131.

Key to the process is a new method of separating the irradiated iodine from tellurium, which bypasses classical—and uneconomical—chemical methods. Details are not given (as patents are pending), but Abbott says it uses an "oxidizing medium" that takes the tellurium from a valence of four to a valence of six. Iodine is liberated in the un-ionized, gaseous form into an undisclosed solution that keeps it from separating into ions. Then iodine ions are vaporized out of this solution and caught in a dilute solution of sodium hydroxide and sodium sulfite, in order to avoid contamination by stray gases such as chlorine. The product, iodine-131, has a half-life of eight days.

**Desalting Water:** Researchers of the University of California at Los Angeles have developed a new membrane that looks promising for saline water purification. The membrane is made from a mixture of cellulose acetate containing magnesium perchlorate and acetone. This forms a sticky film when cast onto a glass plate. When the plate is put into cold water, the mixture forms a solid membrane 0.004 in. thick. Stripped from the

plate and shrunk slightly by dipping into hot water, the membrane can then be mounted on each side of a porous steel disc.

Filtering discs constructed in this manner are then stacked in a plate and frame filter press, and salt water is circulated at an inlet pressure of 1,500 psi. The filter can desalt water about 100 times faster than conventional commercial films, the UCLA engineers say—about 8 gal./day/sq. ft. of membrane. Moreover, potable water was produced in a single pass—from brine with a higher salt content than ordinary ocean water.

**New Fuel:** A new plutonium-uranium fuel for power reactors is being produced in study quantities by Carborundum Co. (Niagara Falls, N.Y.). In the process plutonium oxide received from the Atomic Energy Commission is converted into plutonium carbide powder and mixed with proportionate amounts of uranium carbide powder. The mixture is then fabricated into pellets and sent to Nuclear Development Corp. of America, which will put the pellets into metal jackets and subject them to irradiation tests. Plutonium carbide is chiefly of interest because of its ability to support relatively high reactor temperatures. The pellets will not swell and distort during high-temperature operations.

**Titanium Dioxide:** White pigment-grade titanium dioxide is said to be manufactured at 30% less cost in a process developed by Continental Titanium Corp. (Toronto, Ont.). Although details were not disclosed, the new process was described as a pressure-leaching technique adapted to Quebec ores. A \$2-million plant using the process will be built by Continental Titanium on a site 60 miles east of Quebec City.

**Solventless Varnishing:** A method of varnishing paper without using solvents has been developed by Hungarian engineers Henc Szabadi and Jozef Demeter. Key: the film-drawing properties of phenolic resin. Melted resin is drawn on the paper, where it adheres and solidifies immediately. After moving a few yards, the paper reaches final form on a delivery reel. Temperature and resin thickness are automatically controlled.



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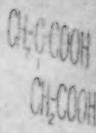
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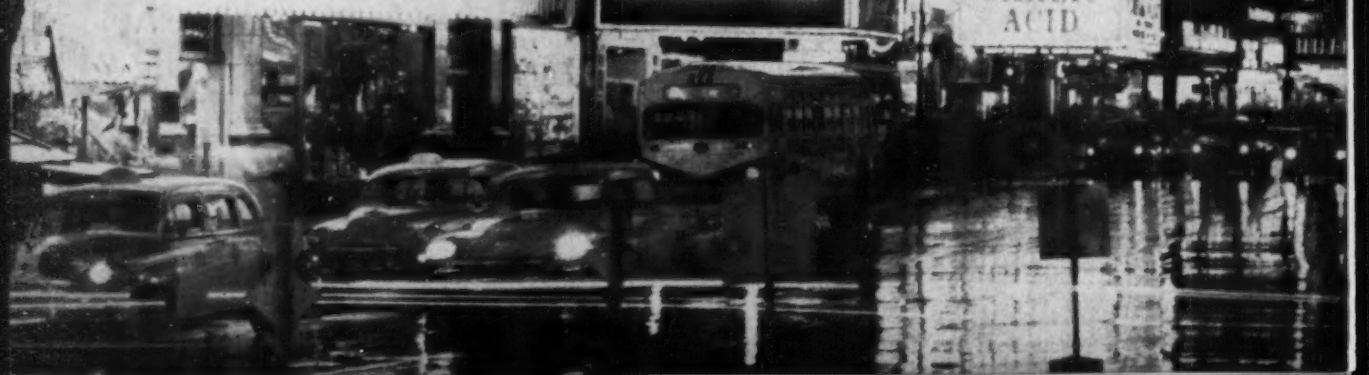
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Cyanamid's Van Blarigan (left) and Van Eck set up system for evaluating plant's process performance.

## Getting a Firmer Grip on Process Control

This week details of a new system for evaluating process performance were revealed by American Cyanamid at the Rutgers Conference on Quality Control at New Brunswick, N.J. Cyanamid developed the system for use at its Bound Brook, N.J., plant, reports that substantial savings are already being chalked up as a result of improving three processes with the technique. Moreover, the firm says that the method, now in operation for about a year, is being extended to 64 processes in two departments.

The system works by focusing attention on processes that are not performing as they should, or as might be expected from past records.

It's based on statistical quality control charts and techniques that have become firmly established in the chemical industry (*CW*, Jan. 3, '59, p. 30). But it broadens their usage to the point where the system's prin-

cipal architects—Hiram Van Blarigan, a statistical engineer at the plant, and Leonard Van Eck, manager of the pigments manufacturing department (*pictured above*)—shun the use of the words statistical quality control.

Van Eck points out that the system moves statistical quality control techniques into the realm of manufacturing management—a step beyond its usual use as a mathematical tool for statisticians. The system permits the plant department head to see at a glance (1) processes that require increased attention because of abnormal operations, (2) processes that require little or no attention because of normal operation. These two points are the heart of a supervisory philosophy called "management by exception," and Cyanamid's technique ties in with it.

Van Blarigan explains the system is concerned with maintaining and

improving the process yields of complex organic chemical batch processes rather than checking key properties of product quality (e.g., moisture content, color, isomeric assay), which are more often the object of study by quality control. Therefore, the term "process performance system" is more descriptive, he says.

**How It Works:** Here's the way Cyanamid described its system at the Rutgers session.\* Statistical quality control charts (called process performance charts in this system) are posted next to the process equipment for each process. The average yield is plotted as a point on the charts—in some cases by the operators themselves, in others by accounting clerks who in all cases also keep smaller charts in the process superintendent's

\* Sponsored annually by the Metropolitan Section of the American Society for Quality Control; arranged by Rutgers University's Statistics Center.

office. Each plot point represents average yield for two or more successive batches. (The technique of plotting cumulative sums rather than averages, suggested by George Barnard in England,\*\* has an advantage of high sensitivity to trends. The plant's statistical engineers are working on the problem of adapting the cumulative sum technique to the process performance system in a way that will give it the simplicity of the averaging technique. Their purpose: to retain the plant operators' active participation on the management-by-exception team.)

As on ordinary statistical quality control charts, a range is set up into which the process yields with normal variations will fall. A green line is drawn along the line that indicates average yield; yellow lines, called warning lines, are drawn at the two-sigma level; red lines, called action lines, at the three-sigma level.

Exceptions to normal performance are defined as plotted points that are outside the three-sigma level or as a significant number of points that may be within the three-sigma level but either above or below the average. The exceptions, with explanations and suggested action to be taken, are immediately brought to the attention of the various levels of supervision (i.e., shift foreman, general foreman, process superintendent, department head). This triggers a prompt investigation. Daily reports of the deviations and the corrective action taken are given to the department manager.

Over-all process performance—and in particular the abnormal operations—are reviewed at monthly meetings of the departmental manufacturing committee, which makes decisions that attempt to consolidate gains, eliminate problems.

Before the monthly meetings, an engineer from the plant's statistical group reviews the process performance charts, calculates new process limits if they are needed. This is the only time that the statistical section serves in more than an advisory capacity for the system.

**Never a Word:** The key to operator understanding and participation in the system is the simplicity with which it is introduced. Before it's installed on a process, a team of statistical en-

gineers goes into the process area to explain the system. Absent from the explanation: references to the word "statistics," or any use of statistical jargon. Both Van Eck and Van Blarigan feel strongly that the word "statistical" tends to frighten plant operators, who play a vital role in the system.

The team, which has usually been composed of Van Blarigan and Steve Jurnack, another statistical engineer at the plant, held trial presentations for some of the supervisors who had had no statistical training so as to get pointers for the presentations to the operators.

Presentations have usually been given to groups of five to ten operators, led off with an introduction of the statisticians by the department manager. One of the team members discussed the general subject and the reasons for using the system; time required: about ten minutes. Then with the use of visual aids such as a quincunx (described to the operators as a "pinball machine that resembles a chemical processing unit in operation") and beads strung on parallel rods to represent process batches (see picture, below), he demonstrated the normal distribution and the random pattern of batch yields in relation to time.

The second member of the team, using data from processes with which

the operators were familiar, showed how the batch yields varied in the same manner as had been demonstrated on the visual aids.

According to Van Eck the new method actually helps operators practice the technique of management by exception. "Good operators are always sensitive to what is happening in the process. But sometimes they are worriers—worrying about things that are not worth wasting time over. The process performance system helps them pick out, in the same way as the department manager, the exceptions in performance that are worth worrying about," he says.

And there's added incentive for the operators to watch for process "exceptions" as pinpointed by the performance system. Ideas to improve process performance may be submitted through the plant's suggestion system. Those that prove correct may result in cash awards.

**Adding up the Score:** Results so far have been encouraging. Van Eck was interested in the system from the viewpoint of his job as a new department manager wanting a better "feel" for his department's performance. He estimates that it saves him several hours a week in studying process yield data. On this score, the system should fit in well into the chemical industry, which has a penchant for moving supervision from one depart-



Van Blarigan, Jurnack teach system's rudiments with visual aids.

\*\*Barnard, G. A., "Control Charts and Stochastic Processes," Journal of the Royal Statistical Society, Series B, Vol. XXI, No. 2, 1959, p. 239.



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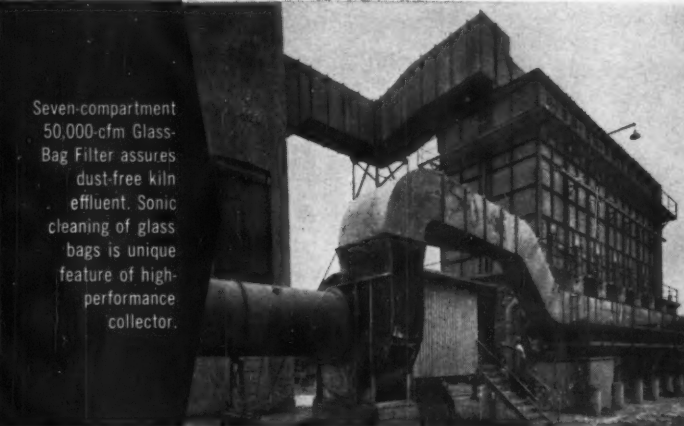
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## PRODUCTION

ment to another. As the plant manager of one large chemical complex in the South puts it: "After a few years in one spot, we feel that a supervisor has made his major contributions there. He'll be used to best advantage if he can be moved to another spot where he'll add a fresh approach. The problem in doing this is the time it takes for him to get acquainted with a new department."

But even for experienced department supervisors, the system has advantages. It helps save time in making decisions based on performance of a process by enabling a supervisor to examine a reasonable operating period on a single chart. There's no need to dredge up old records or to try to remember past performance.

The system, of course, can't stand alone as a complete measure for overall manufacturing efficiency. And, so far, it has been applied only to batch processes (which make up a major portion of operations at the Bound Brook plant).

The cost of plotting the charts is about equal to that of preparing some yield reports (which can be eliminated with the system). And, its ability to draw operators onto the production management team, as well as to pinpoint the areas that require concentrated improvement efforts, should assure it a continuing place as a management technique.

## New Gain in Pollution

Last week chemical plant management in the Ohio River valley got a preview of a new, automated system that will go into operation this fall to check on the effectiveness of pollution-control efforts along the Ohio River. The system, called Orsanco Robot Monitor, was displayed publicly in Government Square in Cincinnati.

As outlined in the exhibit, the system will take test data from electronic analyzer units located at various points along the river, relay it to central headquarters in Cincinnati to a data logger and transcriber for evaluation. When unusual conditions are detected, an alert will be issued to water users and regulatory agencies in eight states. These states organized Orsanco in '48, which has been pushing hard at controlling the discharge of industrial wastes ever since (*CW*, Jan. 11, '58, p. 20).

## EQUIPMENT

**Continuous Weighing:** Industrial Processes, Inc. (621 S. W. Morrison St., Portland 6, Ore.) is out with a new low-cost meter for weighing a wide range of dry materials without interrupting flow. The unit operates on impact principle, translates unit weight of stream flow into electric current by electronic transducer. Called the "IPI" Dry-Flow Meter, the device is 46-in. high, 22-in. wide, 16-in. deep, usually can be installed in spouts or ductwork during normal equipment downtime. Cost, without instrumentation: less than \$1,000.

**Penton Linings:** The U.S. Stoneware Co. (Box 350, Akron 9, O.) and Hills-McCanna Co. (4600 West Touhy Ave., Chicago 46) have added new items of Penton (chlorinated polyether) lined equipment.

U.S. Stoneware is now offering Penton protective tank linings said to be resistant to most organic and inorganic chemicals (except fuming-nitric and fuming-sulfuric acids). The lining material, which fills the temperature gap between polyvinyl chloride and fluorocarbons, is extruded in roll form, installed by local company-trained applicators.

Hills-McCanna's new offering is an 8-in. Penton-lined, packless diaphragm valve. Largest size previously made: 6 in. Suggested applications include on-off and throttling control of chemicals. Maximum operating pressure: 100 psi. at temperatures to 240 F. Cast-iron and aluminum bodies are available.

**Compressor Control Panel:** An automatic control panel for operation of up to five electric-motor-driven compressors from a single control point is a new product of Clark Bros. Co. (Olean, N.Y.). When set in the automatic position, the controls will start up and shut down the compressors in a preset sequence that prevents two units from starting or shutting down at the same time. Each compressor in the sequence must be running before the next unit can start. The panel can also be used to bring another compressor into operation automatically should an operating unit malfunction.

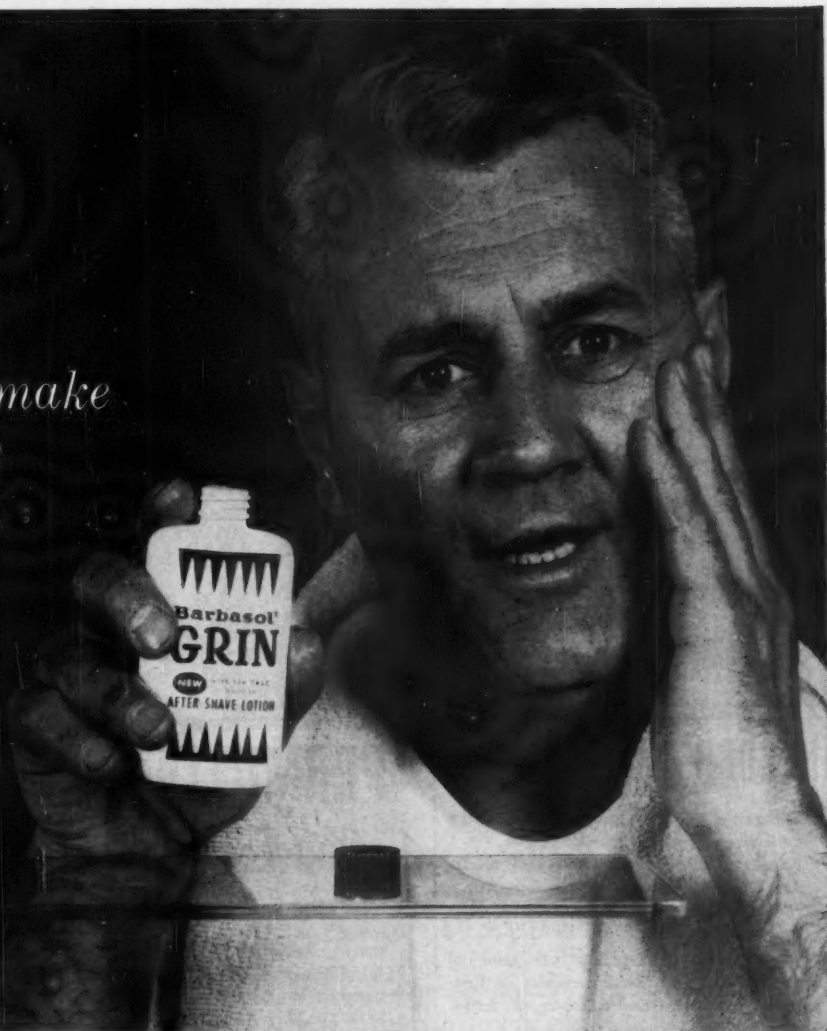
**Pressure Tester:** Consolidated

News about

# B.F. Goodrich Chemical *raw materials*

*Carbopol  
helps make  
after-shave  
lotion*

**"WITH  
TALC  
BUILT  
IN"**



This new after-shave lotion provides a non-oily, non-greasy lotion with talc suspended in the formulation by Carbopol 934. It provides a two-in-one treatment—gives the same effect as applying talcum powder separately after applying lotion.

This suspension of talc in a water-alcohol base demonstrates the advantage you can get by using Carbopol water-soluble resins. You can vary the viscosity by varying the concentration of Carbopol—for example, 0.5% Carbopol produces stable suspensions with high viscosities, 0.3% Carbopol provides stable suspensions with low viscosity. And the suspension is permanent—making possible the squeeze-type bottle packaging used for this two-in-one after-shave lotion.

Carbopol water-soluble resins may be the answer to your need for improving a product or developing products for new markets. For information and samples, write Dept. JB-3, B.F. Goodrich Chemical Company, 3135 Euclid Avenue, Cleveland 15, Ohio. Cable address: Goodchemco. In Canada: Kitchener, Ontario.

*"GRIN with the talc built in" is manufactured using Carbopol 934 by The Barbasol Company, Indianapolis, and is on sale at drug stores and cosmetic outlets everywhere. B.F. Goodrich Chemical Company supplies the Carbopol 934 water-soluble resin.*

**Carbopol**  
*Water-Soluble Resins*

**B.F. Goodrich Chemical Company**  
a division of The B.F. Goodrich Company

**B.F. Goodrich**

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## STRATEGIC SITES FOR CHEMICAL INDUSTRIES

Situated on deep water with railroad and ocean-going transportation, these sites are strategically located for the assembly of raw materials and with respect to domestic and world markets.

Other favorable features include virtually unlimited quantities of water for processing, ample labor supply, and proximity to large centers of population.

For detailed reports prepared on your specific requirements, address in confidence:

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Assistant Vice President  
Seaboard Air Line Railroad Company  
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Richmond, Virginia

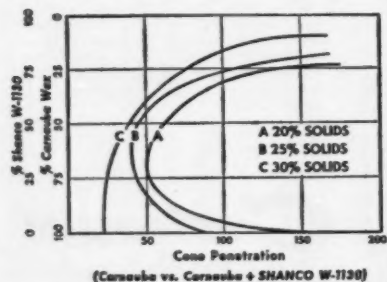


## HARDER PASTE WAXES

Shanco W-1130 will greatly increase the hardness of a carnauba wax paste.

To secure harder paste waxes, we recommend blending Shanco W-1130 and carnauba wax with thorough mixing before softer waxes are added.

Twenty-five to thirty-five per cent of Shanco W-1130 will work wonders on firmness and permit the inclusion of larger amounts of softer waxes.



Your name and address and we'll send you THE SHANCO MESSENGER each month.

# SHANCO

Plastics & Chemicals Inc.  
TWO MILE CREEK ROAD • TONAWANDA, NEW YORK

## PERMUTIT Q Cation Exchanger

Chemical structure: sulfonated polystyrene copolymer

Range of Screen analysis: 16 to 50 mesh  
Shipping wt. (backwashed and drained): 53 lbs./cu. ft.

Allowable pH range of solution: 0-11  
Exchange capacity: up to 35 kgr./cu. ft. (Na or H cycle)

Regenerants: Sodium chloride (Na cycle)  
Sulfuric or hydrochloric acid (H cycle)

Rising space: 75% of bed depth

Backwash rate: 4-5 gpm/sq. ft.

High capacity, cation exchanger. Resists wide pH ranges, high temperatures, oxidizing agents. Useful as catalyst, demineralizer, dealkalizer. Complete ion exchange service: Permutit Q is one of over 30 resins you can get through our unique ion exchange service, which includes (1) Resins, (2) Equipment, (3) Technical assistance. Write for 12-page bulletin, or for a sample of Permutit Q. Permutit Division, Dept. CW-90, 50 West 44th Street, New York 36, N. Y.

 PFAUDLER PERMUTIT INC.

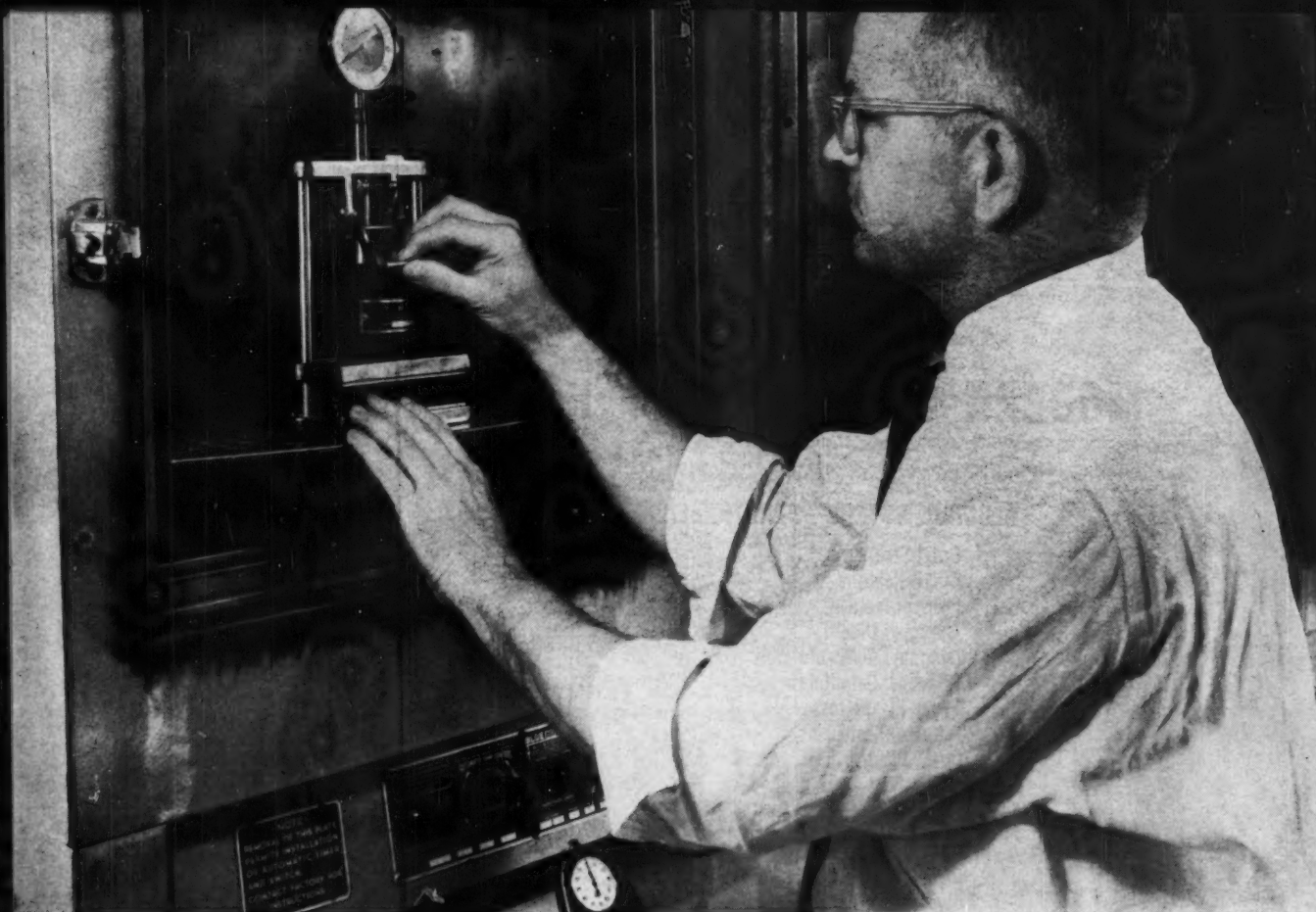
## PRODUCTION

American Services, Inc. (250 North Daphne Ave., Hawthorne, Calif.) is offering for lease or sale a new mobile unit for high-pressure test measurements at any plant location. The unit will measure the pressure, from 2,000 to 15,000 psi., of any type of gas. Its compressor will pressurize 300 running feet of 2-in. I.D. pipe to 15,000 psi. in 90 minutes. Effluent gases from static testing are air filtered, passed through a dehumidifier to maintain dew point required for testing.

**Continuous Mix-Muller:** The Simpson Mix-Muller Division of National Engineering Co. (Machinery Hall, Chicago 6, Ill.) is out with a new continuous muller-type mixer. It has two pans rather than a single pan as is used in the batch mixer. The solid-solid, dry-solid, or wetted-solid materials to be milled enter one pan, are circulated through both pans before being discharged. The operation, called progressive batch mulling, is recommended for mixing applications where a relatively short batch cycle is satisfactory and high production, continuous processing is required. The new muller, tagged Multi-Mull, is available in six models with pan-retention capacities from 6 to 120 cu. ft. Hourly production rates range from 25 to over 2,500 cu.ft. of material.

**Feeders:** Thayer Scale Corp. (Pembroke, Mass.) is offering two new feeders—one, for hard-to-handle materials of flaked or fibrous type that are up to 1½-in. in diameter, the other for flour-like materials that aerate and "flood." The Series C conveyor-feeder for hard-to-handle materials has a two-speed single conveyor belt with two flow-control gates. The unit has a capacity of 80 cfm. at 50% operating efficiency. The Series R rotary feeder for powdery materials has a motor-driven rotor that controls feed rate and pneumatically operated control gates. The unit comes in four models with 3- to 35-cfm. capacities at 75% operating efficiency.

**Tote Bin:** Tote System, Inc.'s (Beatrice, Neb.) new tote bins have automatic door openers. Previous models were opened with a ratchet handle after being tilted at a 45-degree angle to permit discharge of contents.



Dr. W. J. Wald, a Neville Senior Scientist, places a rubber sample in a plastometer in Neville's new rubber laboratories.

Constant research is conducted in the use and application of coumarone-indene resins in rubber compounding.

## Your plastometer will show you why Neville C-I<sup>®</sup> Resins are a superior aid in rubber processing

The unique degree of plasticity derived from the use of Neville Coumarone-Indene Resins in rubber brings many benefits to your processing. You'll obtain improved mold flow, better knitting and a thinner flash line. Mixing, milling, calendering, and tubing will be faster, smoother, and cures will be more uniform.

But processing aid is not the only advantage gained by using Neville C-I Resins. You'll find marked improvement of tensile strength and elongation in many high quality formulations. Moreover, these resins are economically priced and may be used effectively to lower pound volume cost in highly loaded stocks while retaining physicals. They are available in flaked and

solid form and in a wide range of colors from 1/2 to 16 Neville. Softening points are from 10° C. to 155° C. Use the coupon below to write for further information.

Resins—Coumarone-Indene, Heat Reactive, Phenol Modified Coumarone-Indene, Petroleum, Styrenated, Alkylated Phenol • Oils—Shingle Stain, Neutral, Plasticizing, Rubber Reclaiming • Solvents—2-50-W Hi-Flash\*, Wire Enamel Thinners, Nevsolv\* • High Purity Indene.

\*Trade Name

**Neville Chemical Company, Pittsburgh 25, Pa.**

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# Market Newsletter

CHEMICAL WEEK

September 10, 1960

**Echoes of recent polyethylene price cuts** are bouncing back from the packaging field this week. Tabs on several laminated packaging materials that combine polyethylene and aluminum foil have been slashed 7-10%. Reynolds Metals Co. initiated the move, says it's a direct result of lower polyethylene prices (*CW*, Aug. 20, p. 22).

The price cuts will vary, depending upon the specifications of two laminate combinations: aluminum foil-polyethylene-paper-polyethylene; and paper-polyethylene-foil-polyethylene.

Polyethylene and aluminum-foil laminates are one of the fast-growing outlets of aluminum foil for flexible packaging. Reynolds reports its sales of these materials doubled during the 12-month period ended June 30. And the company is highly optimistic about the future, already has expansion plans in the works that will triple polyethylene-foil capacity by the end of '60.

Originally, the company had one machine for polyethylene-foil production at its Bellwood, Va., packaging plant. Recently it installed a second, and will add two more later this year. Each machine is capable of extruding 2.5-3 million yds./month of polyethylene, and simultaneously laminate it to aluminum foil and paper.

Commercial products using packages made of these polyethylene-foil combinations include convenience dehydrated foods—e.g., mashed potatoes, soft drinks, soup, and many boil-in-bag frozen foods.

•  
**Canada continues its sulfur gains.** Production and sales of recovered sulfur in Alberta, Canada, during the first half of '60 were well above comparable figures in '59, according to a report by the Alberta Bureau of Statistics. Sales rose the fastest, from 39,995 tons in first-half '59, to 106,145 tons during the same period in '60, an increase of 165.4%. Production also showed a sharp gain, from 90,161 tons in '59, to 196,185 tons this year, an increase of 117.6%.

•  
**Polyvinyl acetate producers are sitting on a powder keg this week.** Following last week's drop in vinyl acetate monomer prices, pressure has been mounting to cut official tabs on the polymer. Vinyl acetate monomer prices were cut 1.9¢/lb., are down to 15.6¢/lb.

Major polyvinyl acetate producers contacted this week, however, are not anxious to take any fast action to cut prices further, point out that the new monomer tab still doesn't re-establish the monomer-polymer price differential in effect before Du Pont's 2¢/lb. across-the-board cut in Dec. '58 (*CW Market Newsletter*, Jan. 3, '59, p. 35).

The most concern over the source of future price cuts is from the smaller PVA producers who have gained their markets via the price

## Market Newsletter

(Continued)

route. This has resulted in price softness in some areas of the country. But among the bigger, integrated producers, the economics of producing polyvinyl acetate has not really changed, leaves little incentive for another price cut. And among the larger polymer producers who buy monomer, the present profit squeeze makes any further reductions unattractive at this time.

•  
**The recent Tariff Commission report** on production of miscellaneous chemicals in '59 included some new entries, two of which caught some market observers by surprise. Ethyl acrylate, which has been a tough product to make market guesses on, was reported at 44.7 million lbs. At this rate, it is likely that '59 acrylate production was around 60 million lbs. Another difficult estimate, propylene oxide, came in strong at 288.4 million lbs. Production figures for '59 of other chemicals not reported in the '58 report included fumaric acid at 16 million lbs., and isopropyl acetate at 31.3 million lbs.

•  
**Increases in ammonia capacity are being studied** by several producers in the Midwest and South. These increases, which would be accomplished via better catalysts and minor equipment changes, could lift output potential 25-30% /plant, add another 200-300 tons/day to existing U.S. capacity. Reason behind such moves is to supply the booming ammonia market in those parts of the country with a relatively small capital investment.

•  
**Commercial production of four organophosphites** is now under way at Hooker Chemical Corp.'s new unit at Niagara Falls, N.Y. Products produced include triphenyl, diphenyldecyl, phenyldidecyl and tridecyl phosphites. In addition, six other organophosphites are nearing sales status, with 50 more such compounds undergoing product evaluation in the field.

•  
**Overseas capacity for electronic-grade silicon is rising.** In Belgium, Societe Generale Metallurgique de Hoboken has developed a new industrial process for production of silicon, is now constructing a large-scale plant at Olen. Completion is expected about the beginning of '61; capacity will be 1,000 kilograms/month. Output will cover the whole range of "p"- and "n"-type resistivity. The company already operates a small plant at Olen for production of polycrystalline silicon and single crystals.

**Chemical shippers have weathered** the Pennsylvania Railroad strike well so far. Many firms report no problems in diverting shipments or in finding enough trucks for their needs.

But things likely will get tougher for purchasing and traffic men next week if the strike isn't settled by then.

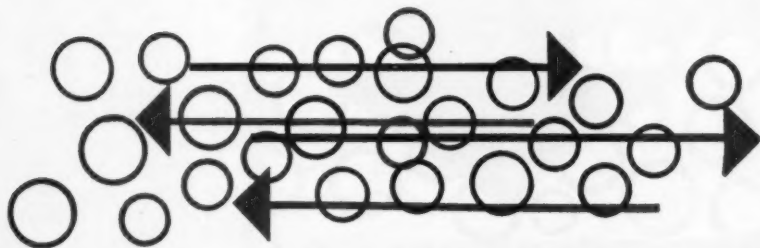
## CHEMICAL ISOLATION

New techniques are allowing chemical separations and isolations formerly impossible. With this issue, Dow begins a new CPI File Series, "Chemical Isolation."

Practical, new applications of old processes are giving chemical processors separation and isolation methods with a high resolving power. Among these processes are ion exchange, chelation, flotation, and extraction.

In ion exchange, Dow has available a long list of ion exchange resins of both the cation and anion types. Today these improved resins and the advanced technology of the ion exchange process have been responsible for the broad acceptance of ion exchange as a chemical processing unit operation. Specific applications of Dowex® ion exchange resins will be presented in this series with new information being presented as it is developed.

Chelating agents also are adding a fineness to chemical processing that allows a very delicate control of metal ions. Again, while the chelating process is old, new chelating products and technology have extended the use of chelates throughout the chemical industry.



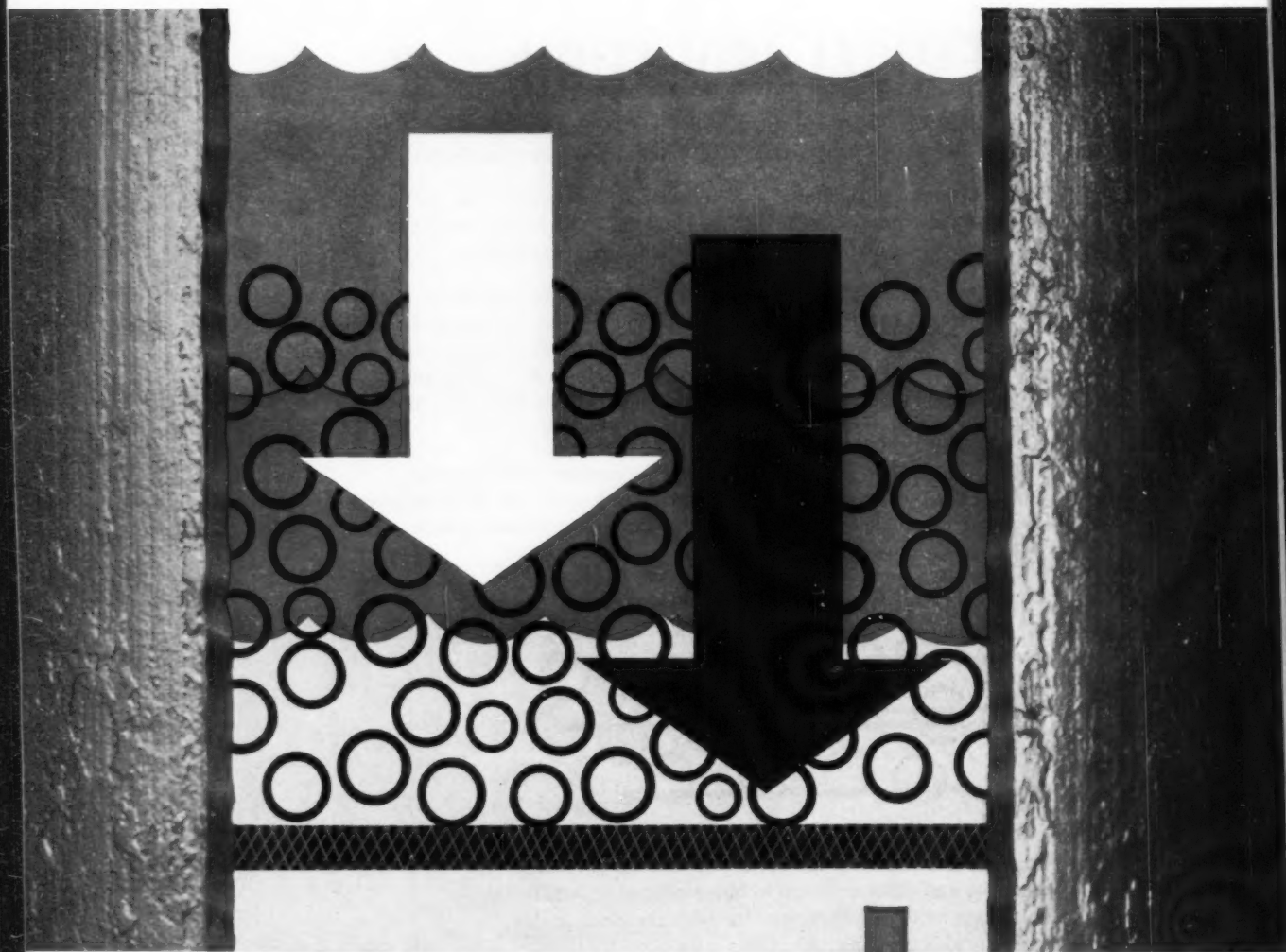
Future advertisements in this series will take up flotation, extraction, and other chemical isolation processes. Additional information on the application of the Dow chemicals in this series is readily available. A coupon is included for this purpose on the second page following.



**THE DOW CHEMICAL COMPANY • Midland, Michigan**

## CHEMICAL ISOLATION

**ION EXCLUSION** is a branch of ion exchange chemistry notable for the efficiency and simplicity of its action. Described below and on the next page is an ion exclusion process using Dowex ion exchange resins. This process shows a method of separating ionized materials from non-ionized or slightly ionized materials when both are present in a water solution. No chemical regenerant is needed. The separation is dependent upon the physical and chemical properties of the resin, and no net ion exchange takes place.



**WHEN AN AQUEOUS SOLUTION** of two or more solutes is passed through an ion exclusion column, a separation of the solutes occurs and they appear in separate fractions in the effluent. Briefly, this is what happens: When an aqueous solution of solutes (such as NaCl and glycerine) is run through an ion exclusion column of ion exchange resin, the *nonelectrolyte* tends to concentrate *inside* the resin particles while the *electrolyte* has a higher concentration in the interstitial liquid. Although this separation is dependent on many variables, the most important is the distribution constant  $K_d$ , shown in the equation at the right, where  $C_i$  is the concentration of the solute in the resin phase, and  $C_o$  is the concentration of the solute in the solution *outside* the particle. For example, with Dowex 50W,  $K_d$  for glycerine is 0.59 and for NaCl is 0.19. This differential in  $K_d$ 's makes the separation of solutes possible, and can be used to determine the order in which a group of solutes will travel down an ion exclusion column. In the case of an aqueous solution of ionic and nonionic solutes, the ionic material appears in the effluent first.

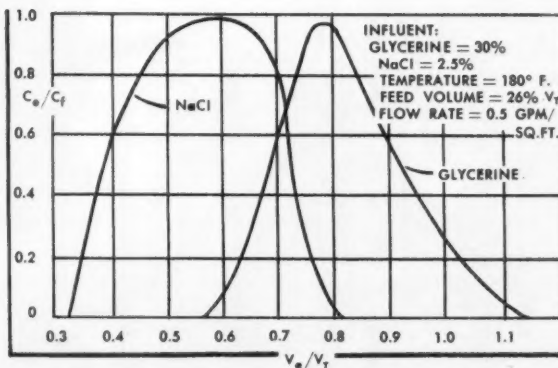
$$K_d = \frac{C_i}{C_o}$$

## ION EXCLUSION

### LOW-COST IONIC-NONIONIC SEPARATIONS WITH ION EXCLUSION PROCESS

Results obtained from operating a pilot plant, using the ion exclusion process for the separation of crude glycerine from its dissolved salts, proved to be predictable. Lack of necessity for chemical regeneration in this process is an important factor in the low cost of operation. Other typical separations achieved by the use of ion exclusion are: acids and salts from alcohols, glycols, and amino acids; the separation of strongly ionized from weakly ionized materials such as acetic acid and mineral acids; and mono-, di-, and trichloroacetic acid.

The glycerine obtained from the pilot plant, which was finished by ion exchange and evaporation, meets or exceeds U.S.P. specifications for glycerine. Although U.S.P. glycerine cannot be made economically by the ion exclusion process alone, further processing of the glycerine effluent from the ion exclusion column by ion exchange to remove the remaining trace of ionic material and concentration by evaporation will produce U.S.P. glycerine of a very high quality. A cost analysis indicates that U.S.P. glycerine could be produced by ion exclusion followed by ion exchange and evaporation for one cent per pound.



**PILOT PLANT ELUTION CURVE.** Graph shows pilot plant elution curve when feeding approximately 30% crude glycerine and 2.5% salt. Feed was made by diluting, with softened water, 82% crude glycerine. Since these eluant curves remain constant under proper operating conditions, a time cycle can be developed from the curve for automatic operation.

## CHELATION

### CONTROL UNDESIRABLE SIDE EFFECTS OF TRACE METAL IONS WITH CHELATING AGENTS

Chelating agents can control many of the undesirable side effects which metal ions cause in processing operations. So effective are the new chelating agents that metal ions, even though still in solution, are virtually eliminated from reactions and are difficult to detect even by chemical means. If a number of different metal ions are present in a system, a chelating agent will complex with the metals in a

predictable order of decreasing stabilities. For example, if copper, zinc, and calcium are present in a system, all the copper will be chelated first, then the zinc, then the calcium. Nearly all polyvalent metal ions react to form stable chelates.

VERSENE® 100 and VERSENEX® 80 are the most widely applicable Dow chelating agents. Both are broad-spectrum chelating agents forming complexes with the same metal ions. Generally, the stabilities of metal ion chelates of Versenex 80 are greater than those of Versene 100. Versenex 80 is, in general, indicated where unusual stability requirements are necessary.

Specialty Chelating Agents are available from Dow for specific problems such as iron control at basic pH, and heavy metal control in strong concentrations of the hardness ions.

Wherever metal ions are found, Dow chelating agents can probably help to control them. Write, stating your problems, to Dow, or mail coupon for descriptive literature.

#### VERSENE PRODUCTS SOLVE MANY METAL ION PROBLEMS

Formation of unwanted insoluble precipitates  
Deposition of sludges and scales  
Catalytic promotion of unwanted reactions  
Reaction with complexing agents to give unwanted colors  
Oxidative breakdown and spoilage of organic material  
(soaps, fats, oils, flavors, pharmaceuticals, etc.)  
Actions causing instability in emulsion systems  
Interference with processing steps (bleaching, dyeing, plating, finishing, etc.)

See "The Dow Hour of Great Mysteries" on TV.

The Dow Chemical Company, Midland, Michigan  
Chemicals Merchandising Dept. 428AM9-10

☐ Dowex Ion Exchange Book

☐ Keys to Chelation Booklet

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Indianapolis.....	Hoosier Solvents & Chemicals Corp.
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Wichita.....	McKesson & Robbins, Inc.*
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<b>TEXAS</b>	
Dallas.....	Texas Solvents & Chemicals Co.
Dallas.....	Van Waters & Rogers, Inc.
El Paso.....	Braun Chemical Co.
Houston.....	Texas Solvents & Chemicals Co.
Houston.....	Van Waters & Rogers, Inc.

\*\*Merchants Chemical Branch

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Salt Lake City.....	Wasatch Chemical Co.
<b>WASHINGTON</b>	
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Spokane.....	Van Waters & Rogers, Inc.
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La Crosse.....	Wisconsin Solvents & Chemicals Corp.
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### For Urea:

<b>ALABAMA</b>	
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Mobile.....	F. H. Ross & Co.
<b>ARIZONA</b>	
Phoenix.....	Braun Chemical Company
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San Francisco.....	Braun-Knecht-Heimann Co.
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Denver.....	Braun-Knecht-Heimann Co.
<b>CONNECTICUT</b>	
Stamford.....	McKesson & Robbins, Inc.**
<b>FLORIDA</b>	
Jacksonville.....	F. H. Ross & Co.
<b>GEORGIA</b>	
Atlanta.....	F. H. Ross & Co.
Columbus.....	F. H. Ross & Co.
Savannah.....	F. H. Ross & Co.
<b>IDAHO</b>	
Boise.....	Van Waters & Rogers, Inc.
<b>ILLINOIS</b>	
Chicago.....	Central Solvents & Chemicals Co.
Chicago.....	McKesson & Robbins, Inc.**
<b>INDIANA</b>	
Fort Wayne.....	Hoosier Solvents & Chemicals Corp.
Indianapolis.....	Hoosier Solvents & Chemicals Corp.
<b>KENTUCKY</b>	
Louisville.....	McKesson & Robbins, Inc.**
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Baton Rouge.....	McKesson & Robbins, Inc.*
New Orleans.....	McKesson & Robbins, Inc.*
<b>MARYLAND</b>	
Baltimore.....	Ledy Chemicals Corp.
<b>MASSACHUSETTS</b>	
Boston.....	Borden & Remington Co.
Fall River.....	George Mann & Co., Inc.
Stoneham.....	Chemical Sales & Service Co., Inc.
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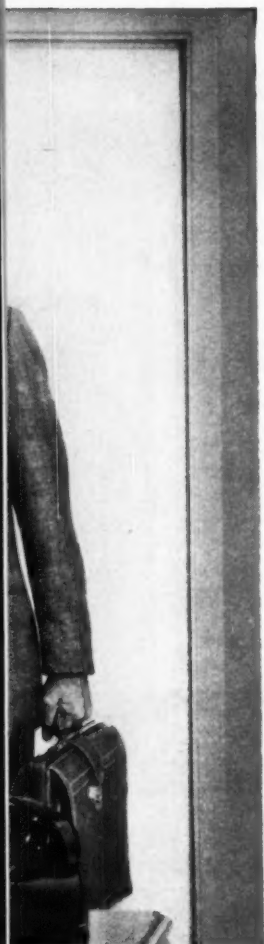
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Kansas City	McKesson & Robbins, Inc.*
St. Louis	Missouri Solvents & Chemicals Co.
St. Louis	
<b>NEW HAMPSHIRE</b>	New England Chemical Supply Corp.
Merrimack	
<b>NEW JERSEY</b>	National Oil & Supply Co.
Newark	Brown Chemical Co., Inc.
Paterson	
<b>NEW MEXICO</b>	Braun Chemical Co.
Albuquerque	
<b>NEW YORK</b>	Chemical Sales Corp.
Buffalo	National Oil & Supply Co.
Hicksville, L.I.	McKesson & Robbins, Inc.**
New York	
<b>NORTH CAROLINA</b>	F. H. Ross & Co.
Charlotte	F. H. Ross & Co.
Greensboro	F. H. Ross & Co.
Raleigh	F. H. Ross & Co.
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Cincinnati	Ohio Solvents & Chemicals Co.
Cleveland	McKesson & Robbins, Inc.**
Columbus	
<b>OREGON</b>	Van Waters & Rogers, Inc.
Portland	
<b>PENNSYLVANIA</b>	Western Penna. Chemical Co., Inc.
Altoona	Western Penna. Chemical Co., Inc.
Erie	Western Penna. Chemical Co., Inc.
Middletown (Harrisburg)	Pioneer Salt Co.
Philadelphia	Western Penna. Chemical Co., Inc.
Pittsburgh	Textile Chemical Co., Inc.
Reading	
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Providence	George Mann & Co., Inc.
Providence	
<b>SOUTH CAROLINA</b>	F. H. Ross & Co.
Columbia	F. H. Ross & Co.
Greenville	
<b>TENNESSEE</b>	Burkart-Schier Chemical Co.
Chattanooga	Burkart-Schier Chemical Co.
Knoxville	F. H. Ross & Co.
Knoxville	Burkart-Schier Chemical Co.
Nashville	
<b>TEXAS</b>	Van Waters & Rogers, Inc.
Dallas	Braun Chemical Co.
El Paso	Van Waters & Rogers, Inc.
Houston	
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Salt Lake City	

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San Francisco	Braun-Knecht-Heimann Co.
<b>COLORADO</b>	Braun-Knecht-Heimann Co.
Denver	
<b>ILLINOIS</b>	Central Solvents & Chemicals Co.
Chicago	
<b>INDIANA</b>	Hoosier Solvents & Chemicals Corp.
Fort Wayne	Hoosier Solvents & Chemicals Corp.
Indianapolis	
<b>KENTUCKY</b>	Dixie Solvents & Chemicals Co.
Louisville	
<b>LOUISIANA</b>	Southern Solvents & Chemicals Corp.
New Orleans	
<b>MARYLAND</b>	Leidy Chemicals Corp.
Baltimore	
<b>MASSACHUSETTS</b>	Howe & French, Inc.
Boston	Chemical Sales & Service Co., Inc.
Worcester	
<b>MICHIGAN</b>	Western Solvents & Chemicals Co.
Detroit	
<b>MINNESOTA</b>	McKesson & Robbins, Inc.**
Minneapolis	
<b>MISSOURI</b>	Missouri Solvents & Chemicals Co.
Kansas City	Missouri Solvents & Chemicals Co.
St. Louis	
<b>NEW JERSEY</b>	Chemical Solvents, Inc.
Newark	
<b>NEW MEXICO</b>	Braun Chemical Co.
Albuquerque	
<b>NEW YORK</b>	Buffalo Solvents & Chemicals Corp.
Buffalo	
<b>OHIO</b>	Amco Solvents & Chemicals Co.
Cincinnati	Ohio Solvents & Chemicals Co.
Cleveland	Ohio Solvents & Chemicals Co.
Toledo	Toledo Solvents & Chemicals Co.
<b>TEXAS</b>	Texas Solvents & Chemicals Co.
Dallas	

<b>EL PASO</b>	Braun Chemical Co.
Houston	Texas Solvents & Chemicals Co.
<b>UTAH</b>	Braun-Knecht-Heimann Co.
Salt Lake City	
<b>WISCONSIN</b>	Wisconsin Solvents & Chemicals Corp.
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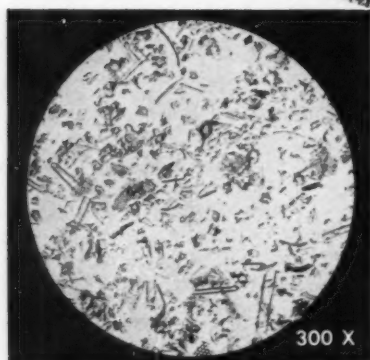
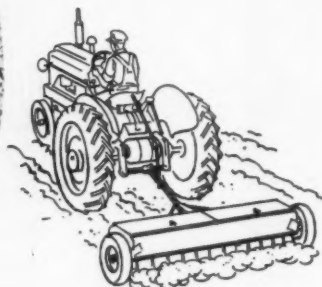
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San Diego	Braun Chemical Co.
San Francisco	Braun-Knecht-Heimann Co.
<b>ILLINOIS</b>	Central Solvents & Chemicals Co.
Chicago	
<b>INDIANA</b>	Hoosier Solvents & Chemicals Corp.
Fort Wayne	Hoosier Solvents & Chemicals Corp.
Indianapolis	
<b>KENTUCKY</b>	Dixie Solvents & Chemicals Co.
Louisville	
<b>MASSACHUSETTS</b>	Howe & French, Inc.
Boston	Chemical Sales & Service Co., Inc.
Worcester	
<b>MICHIGAN</b>	Western Solvents & Chemicals Co.
Detroit	
<b>MISSOURI</b>	Missouri Solvents & Chemicals Co.
Kansas City	Missouri Solvents & Chemicals Co.
St. Louis	
<b>NEW JERSEY</b>	Chemical Solvents, Inc.
Newark	
<b>NEW MEXICO</b>	Braun Chemical Co.
Albuquerque	
<b>NEW YORK</b>	Buffalo Solvents & Chemicals Corp.
Buffalo	
<b>OHIO</b>	Amco Solvents & Chemicals Co.
Cincinnati	Ohio Solvents & Chemicals Co.
Cleveland	Ohio Solvents & Chemicals Co.
Toledo	Toledo Solvents & Chemicals Co.
<b>TEXAS</b>	Texas Solvents & Chemicals Co.
Dallas	
El Paso	Braun Chemical Co.
Houston	Texas Solvents & Chemicals Co.
<b>UTAH</b>	Braun-Knecht-Heimann Co.
Salt Lake City	
<b>WISCONSIN</b>	Wisconsin Solvents & Chemicals Corp.
Milwaukee	

\*Hafford Chemical Co. Branch



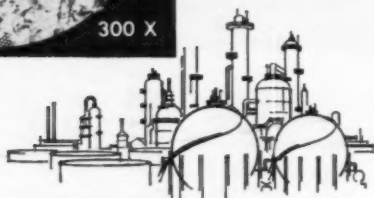
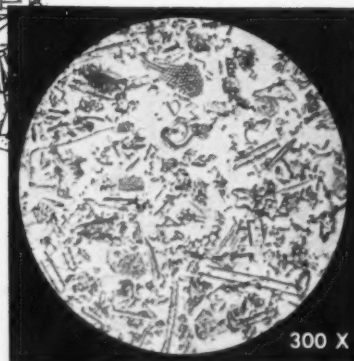
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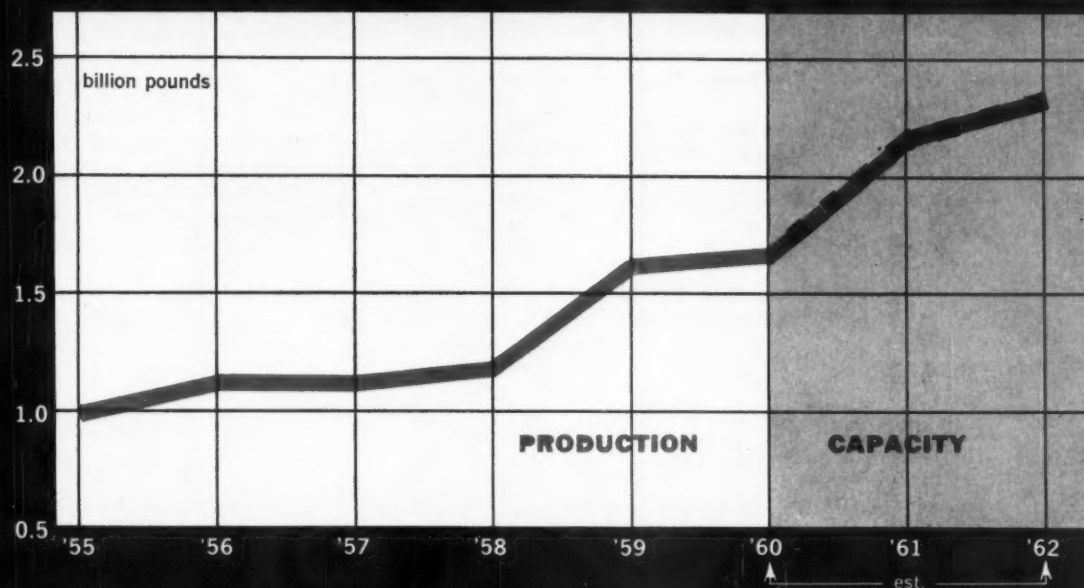
For technical data on specific mineral filler or filtration problems, talk to your nearby Celite engineer. Or write to Johns-Manville, Box 14, New York 16, N. Y. In Canada, Port Credit, Ontario.

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# **JOHNS-MANVILLE**



## Styrene Monomer Capacity – Still Going Up



## Bullish Styrene Makers Go on Building

Is the styrene market heading for a glut? Although there are a number of pessimists who predict the likelihood of such an event, the majority of market experts are generally optimistic over the prospects for styrene monomer demand.

They point to surging plastics markets—particularly high-stepping polystyrene—and steadily growing styrene-butadiene rubber business to furnish the needed outlets for swelling styrene output.

There have been a rash of recent styrene expansions (*CW*, July 30, p. 21). Monsanto, for one, continues its scouting activities for a site for a proposed 100 million lbs./year unit. Most likely location: the Gulf Coast area.

Result of such activity is that styrene monomer capacity keeps climbing (see chart above). Between now and early '62 monomer capacity will leap nearly 700 million lbs.; from present capacity of 1.56 billion lbs. to 2.2 billion lbs. in '61 and at least 2.37 billion lbs. by '62.

Since its last production set-back in '54, styrene demand has moved up

rapidly, from 704 million lbs. in that year to 1.57 billion lbs. in '59. This was 350 million lbs. more, or 28% higher, than '58's output. And demand for '60 continues to set a fast pace.

During the first six months of '60, styrene monomer output was at a rate of 1.75 billion lbs. While the summer slack has pulled this level down, producers are looking for a fall pickup that will put year-end totals close to 1.7 billion lbs., an increase of 8% over '59. Producers contacted this week say the pickup has already started, with orders for the raw material starting to come in strong. By '62, production is expected to pass the 2 billion lbs./year mark.

**Polystyrene Now Tops:** Booming plastics markets account for this optimism. Topping the list are styrene-type resins, now the major outlet for styrene monomer, and accounting for some 50% of monomer output. This year heavier polymer demands will push these resins over the billion pound/year mark, topping last year's peak of 977 million lbs.

Within this group, straight polystyrene, used for molding and extrusion, is the largest volume resin. This year output of polystyrene is holding strong, will probably be up more than 80 million lbs. to an estimated 750 million lbs.

To meet current and future demands, several producers have recently expanded polystyrene capacity; other hikes are on the way. Dow recently completed one enlargement of its polystyrene foam capacity, and is reported to be considering an additional one.

Rexall's Granada division at Santa Ana, Calif. is presently upping capacity from 8 to 12 million lbs./year. Foster-Grant and Koppers plan respective additions of 25 million lbs. and 10 million lbs. to be completed next year if everything proceeds smoothly as planned.

Plastic Materials and Polymers, Inc. (Hicksville, Long Island, N.Y.), recently started construction on a 6-million-lbs./year plant, expected on-stream in Jan. '61, which can easily be expanded to about 12 million (*CW*, July 30, p. 41). Shell joined

## U. S. Styrene Monomer Capacity

(million pounds)

Producer	Location	Estimated '60	capacity '62
<b>Cosden-Grace</b>	Big Spring, Tex.	20	70
<b>Dow</b>	Freeport, Tex.	350	500
	Midland, Mich.	200	350
<b>Foster-Grant</b>	Baton Rouge, La.	105	145
<b>Koppers</b>	Kobuta, Pa.	185	185
<b>Monsanto</b>	Texas City, Tex.	400	500
	Probably Gulf area	—	100
<b>Odessa Styrene</b>	Odessa, Tex.	60	80
<b>Shell</b>	Torrance, Calif.	140	215
<b>Sinclair-Koppers</b>	Houston, Tex.	—	70
<b>Suntide</b>	Corpus Christi, Tex.	—	60
<b>Union Carbide</b>	Institute, W. Va.	100	100
		<b>1,560</b>	<b>2,375</b>

the ranks of commercial polystyrene producers only last month to become the 13th polystyrene producer. Of these, five major ones turn out almost 90% of the polystyrene molding material in this country.

Amoco had plans earlier for a new, 30-million-lbs./year polystyrene plant but the project has since become inactive and further work has been suspended. Amoco decided to shelve the plant for two reasons: (1) the downward trend of polystyrene prices and (2) Amoco had planned to use a nonconventional process and ran into formidable technical difficulties that would have taken time and money to iron out. But most other industry men hold a more enthusiastic opinion of polystyrene's future, as indicated by their own moves to hike capacity.

In work is a move by one major producer that should boost styrene usage. This producer is planning to introduce a number of specially formulated polystyrene resins designed to better compete in areas now dominated by wood, paper, metal and other plastics. The move to broaden polystyrene's scope—mainly into furniture and containers—will come about

through modest price cuts of specific resins down to the level of general-purpose resin pricing.

**Many Markets:** Underlying the phenomenal growth in polystyrene molding materials are two major consumer areas that account for almost 40% of this thermoplastic's market. Major appliances, largely refrigerators and air conditioners, and packaging have upped polystyrene demand so much in recent years that it is headed toward the same volume class as vinyl and polyethylene—both billion-pound plastics in '59.

While refrigeration uses will consume 20% of the polystyrene molding material this year (150 million lbs.) a slowdown in the large appliance market took the edge off of the expected increase in polystyrene during the first half of '60. (Some observers predicted this year would show almost as much gain as '59 had over '58.)

Packaging—including containers, films, cushioning and insulation material—has been growing the fastest of any polystyrene market, now consumes about 15% of output. Many feel that its volume will soon surpass that of refrigeration and move into

first place. The bulk of styrene used here is the general-purpose and impact material for containers.

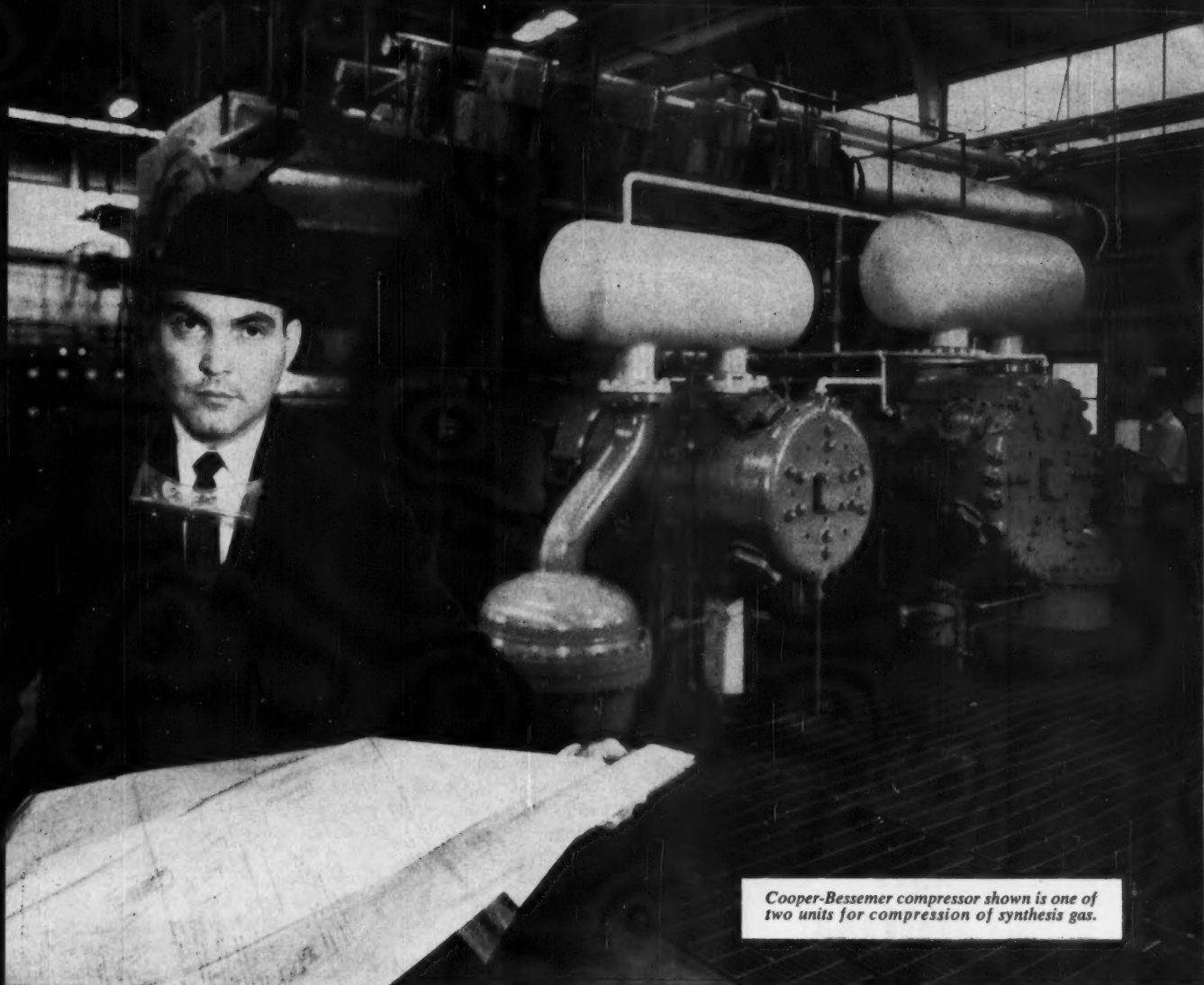
One smaller polystyrene area—but growing quietly as the result of stepped-up research programs—is expanded polystyrene foam. With an expected market this year of about 50 million lbs., it is possible this outlet could multiply swiftly if new products catch the consumers' fancy.

One example: thin (10-30 mils) polystyrene foam sheet (Monsanto's Santofome and Dyna-foam Corp.'s Dyna-foam), which has been successfully laminated to paper cups and bags. The product will compete with conventional 2-ply paper, aluminum foil and fibrous material as container insulation. A battle of production costs with some patent overtones still lies ahead but commercial production is nevertheless expected within a matter of months.

Typifying enthusiasm for sheet foam's future is Dyna-foam President Joseph Resnick, who estimates that 10-20 million lbs. of Dyna-foam will be turned out in '61 with that figure climbing to 100 million lbs. within five years.

**Autos Carry Styrene Rubber:** Another major force pushing up styrene demand is synthetic rubber (SBR), which now constitutes about one-third of monomer consumption. Last year, with production of SBR up 28% over '58, SBR passed the million-long-tons mark. Today SBR represents nearly two-thirds of all rubber going into tires and tire products. While this proportion of the rubber market is not likely to change much, due to a fixed minimum demand for natural rubber, total volume will be increased as the rubber industry expands. With '60 automotive business moving nicely, SBR is expected to receive a 15% boost this year to 1.2 or 1.3 million long tons.

**Other Polymers Growing:** Co- and ter-polymer materials have also kept close pace with monomer growth. ABS materials (acrylonitrile/butadiene/styrene), marketed by Marbon (Cycolac), and U. S. Rubber (Kralastic and Royalite) were joined by a new producer last month when Goodrich Chemical (Abson) entered the field (*CW Market Newsletter*, Aug. 13). In the last six years demand for these resins has swelled from 12 million lbs. to an estimated 30 or



*Cooper-Bessemer compressor shown is one of two units for compression of synthesis gas.*

**Henry LaRue, Ammonia Area Superintendent, Spencer Chemical Company, Vicksburg, Mississippi explains...**

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### MARKETS

#### Styrene End-Uses

	million pounds
<b>Polystyrene</b>	<b>750</b>
<b>Synthetic rubber (SB-R)</b>	<b>525</b>
<b>Polyester resins</b>	<b>65</b>
<b>Protective coatings</b>	<b>70</b>
(styrene-butadiene latex, alkyds)	
<b>High-impact and other resins</b>	<b>100</b>
<b>Exports</b>	<b>140</b>
<b>Total</b>	<b>1,650</b>

40 million lbs. this year. Typical applications include telephone headsets, luggage, pump impellers, tool handles, and similar uses where the material must withstand much abuse.

Protective coatings now take an estimated 70 million lbs./year of the monomer, the bulk being consumed in styrene-butadiene latexes for paint bases. Most of the balance goes into alkyd resins.

Polyester resin output has grown considerably in the past 3-4 years, now consumes an estimated 65 million lbs. of styrene monomer. This outlet is expected to grow rapidly.

**Monomer in Motion:** The monomer situation, meanwhile, is not all that it appears to be. The 140-million-lbs. discrepancy between this year's estimated monomer production of 1.7 billion lbs. and the rated capacities of producers (see chart, p. 124) is due to two factors: (1) Demand has forced producers to turn out material over and beyond rated capacities and (2) some of the substantial monomer expansions (Dow's 300 million lbs. and Monsanto's 20 million lbs.) are already partially in operation and thus tend to swell the production figure without affecting theoretical capacity.

Exports of styrene monomer dropped off somewhat last year—from 130 to 80 million lbs. While this market was expected to be on the downslide this year because of several foreign monomer plants coming onstream, the drop is not materializing. In fact, this year should see even more monomer exported than in '58, with total overseas shipments hitting about 140 million

lbs. This figure will probably remain relatively steady for the next few years, then be gradually reduced as more foreign monomer capacity comes onstream.

With styrene demand expected to be about 2 billion lbs./year by '62, the industry will be running at the seemingly high rate of 85% of capacity. Even at this level there will be more than 350 million lbs. of idle capacity. But if major new plastics are developed—as predicted by many plastics experts—producers will be able to cash in on their optimism.

### No Cobalt Crisis

There's enough cobalt now stockpiled in the U.S. to feed industry for the next few years, even if world production should drastically drop, F. R. Morral recently told the Permanent Magnet Producers Assn. in Chicago. In addition, the cobalt production facilities in this country and Canada would be more than sufficient to match the present cobalt demand of 5,000 tons/year, he explained.

With the normal source of much of the U.S.'s imported cobalt coming from Cuba and from the Congo, there had been some concern about scarcity. Political friction has caused Cuban sources to be cut off, at least temporarily, while mining operations in the Katanga province of the Congo are now uncertain. Mining was suspended in mid-July, but it has since been resumed.

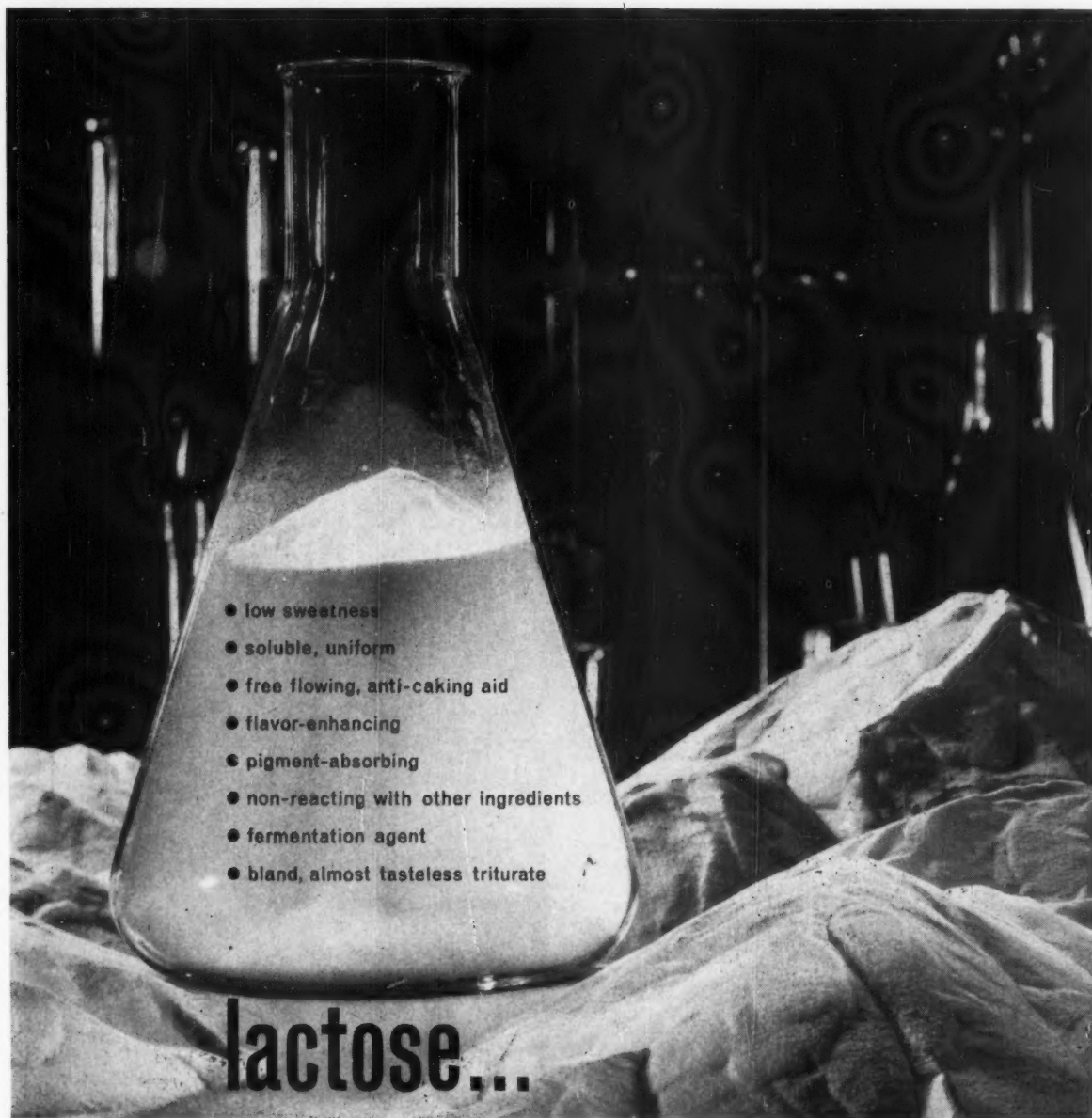
Morral, director of the Cobalt Information Center, believes that with other sources of supply operating normally there should be no cause for concern in the U.S. He based his optimism on these points:

(1) New methods to recover cobalt from low-grade ores have been developed, and conventional processing improved.

(2) Plant facilities have been increased throughout the world. If necessary, the U.S. and Canada together could produce more than 6,000 tons of cobalt each year.

(3) Annual consumption of cobalt and cobalt alloys in the U.S. has remained fairly constant over the past 10 years—about 5,000 tons/year.

(4) Cobalt stockpile in the U. S. is 27,000 tons, should last five years.



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Deuterium officers McComb and Spevack discuss results of pilot stock offering in new company.

## Planning for Heavy-Water Process Profits

The end of a long, weary road and the beginning of a better one appeared to be in sight this week for atomic inventor Jerome Spevack, whose battle for his rights in government-used processes has set legal precedents. Spevack last week completed the sale of a \$300,000 stock offering in Deuterium, Corp., a company formed to exploit his heavy-water manufacturing process.

The offering, which amounted to 30,000 shares of 5% noncumulative, redeemable, convertible preferred stock, will go mainly to secure office space for the company, carry on windup litigation for compensation for the government's use of Spevack's process, and organize for a larger public offering late this year that would raise funds to build the nucleus of a chemical complex on a site

"within 60 miles of New York City."

**Basis:** The core of Deuterium is Spevack's key patent on the processing of water to make deuterium oxide for use as a moderator in atomic reactors. In a precedent-setting series of litigations, Spevack was able to prevent disclosure by the Atomic Energy Commission of his process until he could patent it both here and abroad (*CW*, Aug. 1, '59, p. 45). According to Spevack, his process brought the direct cost of making deuterium oxide down from an original \$210/lb. to \$13.41.

Now, Spevack believes, worldwide demands for heavy water will eventually far outstrip the capacity of AEC's plant at Savannah River, Ga. Since other manufacturers around the world use costlier processes than his, Spevack thinks private production via

his system would be highly profitable. He cites as an indication of his market a study by the Organization for European Economic Cooperation (OEEC) that says that by '75, assuming that some 25% of all reactors installed worldwide by that time will be heavy-water-moderated, there will be a demand for "some 7,500 tons of D<sub>2</sub>O."

In this context, and considering the tremendous investment required for the building of a heavy-water plant, it's apparent that production and marketing of D<sub>2</sub>O by the new firm is at least five years off. Therefore, says Spevack, Deuterium, Corp., will turn its immediate attention to more common chemicals and the building of a staff and research organization. By selling research and by making low-cost, readily salable chemicals, he hopes to start and maintain the organ-

ization necessary to eventually capitalize on his heavy-water patents.

Spevack refuses to say now what chemicals he plans to make until he can produce deuterium. For the long range, look for deuterated chemicals along with heavy water. Current research indicates commercial uses for some of these materials.

**Press Suits:** Meanwhile, the company has potential assets in possible compensation for the use of the Spevack process. Suits have not yet been filed, but Spevack is convinced that when they are they will be successful. Contributing to his optimism: the U.S. government is already on record as saying that "if [Spevack] has a patentable improvement which the commission has utilized he is entitled to just compensation for such use." Under the laws, the company—to which Spevack has assigned an interest in his patent—could collect for use of the process both before patenting and afterward.

Although Spevack will make no judgment on how much the compensation might be, he does point out that the cost savings—the difference between \$210 and \$13.41—from his process multiplied by the amount of production since it was first utilized amount to about \$2 billion.

**Organization:** Right now, Spevack's company amounts to himself, as president, his wife Ruth, as secretary, and a vice-president for sales, Richard McComb; added to this is a nine-man board of directors. Later, of course, as plans for the next offering shape up, and more funds come in, a research and sales staff will be added.

Spevack has made one important innovation in the policy of the firm with respect to the rights of its scientists and engineers—a policy based on his own experiences in trying to capitalize on his invention. Although employees will follow the standard practice of assigning their inventions to the company they will "retain a property right entitling [them] to receive a 15% share of the net proceeds or royalties realized" from them. This continues even if the employee leaves the company.

**Outlook:** Spevack's venture is obviously a long-range affair. Nevertheless, friends and observers say, his doggedness in establishing his patent rights indicate that he will eventually achieve his aims.

## Revamping for a Second Try

Last week, while Deuterium, Inc., was optimistically mapping its future (see preceding story), another relatively new company, Century Chemical Corp., was energetically trying to find the road back to the bright future it had once sighted. With a new—and strictly temporary—hand at the wheel, a severely pruned staff and a breathing spell granted by creditors, the company hopes once more to set a course for profits.

The temporary guiding force at Century is Emmons Blodgett, who's carrying the title "executive vice-president and chief executive officer." Primarily, he's a vice-president of Stone & Webster Securities Corp., which has placed \$1.5 million in Century debentures. Theodore Hodgins, former president and founder of Century, is now chairman of the board. The presidency of Century is open.

**Earnings Vitalizer:** Blodgett says simply, "Predicted earnings weren't coming in and expenses were way out of line with sales. Necessary actions hadn't been taken, and we had to step in."

While industry observers credit Hodgins' vision and drive for putting Century in business, they think the company now needs more of a detail man to bring it along.

Not a chemical man, Blodgett sees himself as a business man whose first order of business at Century is to realize some "drastic economies and reduce overhead expense." He told **CHEMICAL WEEK**: "I've been in this job only a few days and haven't made too many definite plans yet. I'll have a better idea of what we're going to do in a couple of weeks, after we have a full report from the auditors."

**Some Plans Already:** One plan, already in the works, is to move company headquarters out of its present expensive Madison Avenue location to the plant of its Chemo Puro subsidiary in Newark, N.J. This move is due within the next few weeks; the company has already closed down its Wilson Organic Chemicals subsidiary (Sayreville, N.J.) and moved that segment's equipment into storage at Newark for possible later use.

Also, on Aug. 24, Century held a creditors' meeting at which over half the major creditors were represented.

Most of the representatives had authority to act for their companies and agreed to a moratorium until Century management could show definite plans and make some improvement in its situation. No limit was set on the moratorium, but it seems likely to last until the next meeting, due in about two months.

The appearance of a Stone & Webster man in the driver's seat apparently has calmed any would-be agitators among debenture holders. Blodgett believes they are waiting until Century settles its plans. S & W placed \$1.5 million of Century's debentures with its own clients.

**Rabbits in Hats:** Like a good magician, Blodgett knows you can't pull a rabbit out of a hat unless the rabbit's already there. And so, there's little doubt among industry observers that "Blodgett's got something already lined up." Blodgett himself says, "Of course, we'd sell the company now for the right price, but we're not announcing anything yet."

His avowed long-range plans are simple enough, on paper. He hopes to make the prospect of sale "more lucrative and appealing." Blodgett admits that "finding a buyer is still our long-range plan, but we certainly have to clean house first." His means to this end will be slashing overhead in all departments, and probably building up the Chemo Puro subsidiary, now operating profitably at the factory level, until it's enough in the black to carry Century overhead, too.



Hodgins: Now Century's chairman.

*Now on an installed-cost basis—*

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## Drug Cases Move On

Legal actions are moving into advanced stages against General Pharmacal Co. (Hoboken, N.J.), manufacturer of nonbrand drugs, whose officers have been charged with counterfeiting products of major manufacturers.

Most recent move is last week's hearing by Hudson County District Court Judge Henry McFarland of state demands for destruction of drugs found in the firm's eighth-floor manufacturing area. McFarland has already ordered destruction of drugs in the firm's basement warehouse because of the filthy conditions there.

The firm had been shut by the New Jersey State Health Dept. in July because it allegedly produced drugs under "grossly insanitary" conditions. Simultaneously, two of its officers, Howard Press and William Etis, along with independent chemist Isidore Rutstein, were arrested for counterfeiting drug products of Smith Kline & French, Ciba, Schering, Merck, Wyeth, Wallace Laboratories, Warner-Chilcott.

As the result of preliminary hearings completed in mid-August, the counterfeiting case was bound over for action by a Hudson County grand jury.

Complicating efforts to destroy the company's products are actions by creditors who seek to put the firm in receivership. Their hope, of course, is to salvage and sell as much of the firm's products and equipment as they can to pay debts. The firms seeking receivership are equipment suppliers to General Pharmacal, as well as clients for whom General tableted and packaged over-the-counter drugs.

**Prosecution's Plans:** Prosecution of the counterfeiting charges is expected to produce testimony that General Pharmacal's operations extended well outside of New Jersey and included companies in Hollywood, Fla., Chicago, Dallas and Toronto. The firms in these cities, it's said, were outlets for interstate shipments of the forged drugs, were operated under "blind" names.

The use of the blind corporation or address is integral to illicit operations, say health and enforcement officers. Indeed, testimony in the General Pharmacal case revealed that Isidore Rutstein had no corporate con-

nection with General, although he was seen visiting its offices many times. Allegedly, drugs counterfeited by General were distributed from a shipping and transfer company operating under a sidedoor address of a building Rutstein once had title to. In the case of the Chicago outlet, prosecution holds that address stencils found in General Pharmacal's plant are connected with the brother-in-law of the president of a firm recently raided by Chicago health officers.

Grand jury hearings of counterfeit testimony will begin later in the fall. Meanwhile health officers are destroying General Pharmacal merchandise authorized for destruction by the court. Drug firms are expected to make a broad publicity campaign from these actions as evidence of their interest in protecting the public health, and that so-called "generic equivalents" are not always produced under the best of conditions.

## Readying for Oil Strike

Returns are rolling in this week in balloting by locals of the Oil, Chemical & Atomic Workers Union concerning demands it will make in upcoming bargaining sessions with oil companies. Although votes were supposed to be in by mid-August, the deadline was extended two weeks.

Earlier in the summer a bargaining policy committee proposed that an 18¢/hour wage increase be demanded. Provided they ratify this, locals will strike unless their demand is met. A majority of 75% of membership must vote for the proposal to make it binding on all. Of those that have voted so far, says OCAW, three-fourths have favored ratification.

OCAW says the reason for extension of the voting deadline is that "several groups requested a delay because their schedule of meetings and other activities" made an earlier vote impractical.

**Solid Gulf Coast:** Along the Gulf Coast, where bargaining settlements are often pattern-setting, union locals have voted solidly to ratify the bargaining policy. Some 25,000 workers are represented at:

- Houston—Crown Central Petroleum, Phillips Chemical, Petro-Tex Chemical, Sinclair Refining, Shell Oil and Shell Chemical.
- Texas City—Amoco Chemicals,

American Oil, Republic Oil Refining, and Service Pipeline.

- Corpus Christi — Delhi Taylor and Sinclair Refining.
- Beaumont—Socony Mobil.
- Port Arthur—Atlantic Refining, Gulf Oil and Texaco.
- Port Neches — Goodrich-Gulf Chemicals, Neches Butane Products, Pure Oil, Jefferson Chemical, Texas-U.S. Chemical, and Texaco.
- Silsbee—Sinclair Oil and Gas.
- Lake Charles, La.—Cit-Con Oil.
- New Orleans, La.—Tennessee Oil Refining.

The union did not seek a vote at Humble Oil's New Orleans refinery because the contract there is very recent and it felt "it was unnecessary to open it."

But while the union is lining up its strike threat, companies are preparing their position that oil refining is in hard times, that it can afford no wage increases. The Independent Petroleum Assn. of America has pointed out that refineries are running about 450,000 bbls./day too much crude oil—current rate is 8.25 million bbls./day. Humble Oil at New Orleans and Gulf Oil at Philadelphia have announced cutbacks.

## New Business Indexes

**Chemical process management** may soon have a new economic index for use in forecasting some business conditions. It's an index of employee recruitment advertising, reflects employment demand.

At least two such indexes have been devised and are being tested. One is a broad-scale, all-industry measure; the other, a highly specialized measure of demand for technical manpower. Economists caution that they are merely aids to forecasting and not to be used alone.

**Broad View:** For the fifth straight month, the National Industrial Conference Board's Help-Wanted Index has registered a decline in the volume of help-wanted advertising found in leading newspapers of 33 major metropolitan areas throughout the country. Although NICB makes no predictions as to what the decline may indicate, it does say the index is "very sensitive and may give us advance notice of the business cycle and, particularly, labor-market conditions."

Proponents of the new plan point

*sleek...  
trim...  
and perfectly coordinated!*



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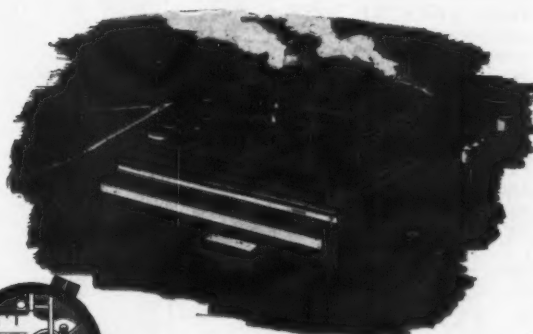


Like the building itself, our equipment is new and the very latest in mechanical efficiency.

This fully integrated plant has every facility for turning out every kind of multiwall bag . . . open mouth or valve, sewn or pasted, stepped-end, and our own patented Kraft-lok® valve; also bags with special inserts, sleeves, protective linings or outers, and vapor barriers.

The best in multiwall bags—are Kraft Bags!

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## ADMINISTRATION

out two advantages of the help-wanted index for analyzing and predicting the business cycle: (1) information can be found quickly; (2) data can be broken down on a regional basis—a feature that's been needed for a long time, NICB believes. The 33 cities from which the ads are taken are major labor market areas.

Aside from being sensitive to the relative "tightness" of the labor market, the index may prove to be a sensitive "leading indicator," consistent enough to be used for predictions of employment and business. There's evidence that the volume of help-wanted advertising dropped several months before employment began to fall in the two most recent recessions. It has not led upturns, however.

**Index for Scientists:** One disadvantage of the NICB index is that no industry breakdown is available; it represents the entire civilian labor picture. However, Deutsch & Shea, Inc., technical manpower consulting firm, has developed an Engineer/Scientist Demand Index, which is based on monthly measurement of recruitment advertising directed to engineers and scientists. The measured ads are taken from a group of technical journals, leading newspapers in 20 key market areas, and association publications. The company believes its index will reveal both extent and intensity of recruiting activity.

D&S's index shows a 13% drop in demand for scientists and engineers during July which, the company says continues a downward trend established in the second quarter of 1960 and also represents the usual seasonal fall-off in professional recruiting activities during the summer.

## LEGAL

**Explosion Case Killed:** The government's criminal action against Pacific Powder Co. (Seattle, Wash.) (*CW*, July 16, p. 86) has been dismissed in U.S. district court in Portland, Ore. Judge G. J. Solomon ruled that Interstate Commerce Commission regulations governing operation of private carriers are invalid because of apparent Congressional oversight in passage of the 1935 law on which the regulations are based. While the law fully covers transportation of explosives by common and contract carriers, it gives ICC regulatory powers

only over qualifications and hours of work of drivers and type and condition of trucking equipment.

**FDA Classification:** The Food & Drug Administration has affirmed its earlier proposal to classify certain folic acid-containing vitamin preparations. Those that have more than 0.4 milligram of folic acid per daily dose are to be classed (and labeled) as drugs for sale only upon prescription.

## LABOR

**Phosphate Trouble:** The phosphate fields around Bartow, Fla., are in labor upset again. Last week the Southern Conference of Teamsters replaced Local 36, International Chemical Workers Union, as bargaining agent at the fertilizer and quarrying plant of Virginia-Carolina Chemical Corp. Vote: Teamsters, 339; no union, 197; ICWU, 154. However, since 44 votes have been challenged, a runoff seems likely. It's not yet known how the challenges affect voting majorities.

For over a year, in spite of the incumbency of ICWU, the workers at the plant have had little real representation, for they have worked without a contract since a violent strike last summer. Meanwhile, management has tried to convince employees they would be better off with no union.

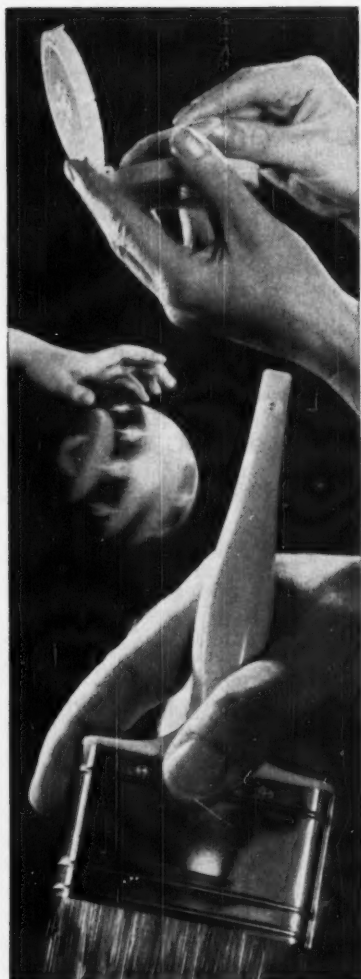
**Allied Strike:** At Allied Chemical Co.'s Ironton, O., Semet-Solvay plant, 350 employees represented by Local 10522, Oil, Chemical & Atomic Workers went on strike over terms of a new contract. The company's offer of a 16½¢/hour wage increase over a period of two years was rejected.

**Paper Pact:** Crown Zellerbach Corp.'s Carthage, N.Y., plant and two unions—United Papermakers and Paperworkers and International Brotherhood of Pulp, Sulphite and Paper Mill Workers—have agreed on a two-year contract. It calls for a 4% wage increase each year, with a 7¢/hour minimum during the first year.

**Rubber Contract:** A month-long strike at Ruberoid Co.'s gypsum plant in Wheatland Center, N.Y., has ended with settlement on a one-year contract with Cement, Lime and Gyp-

# BRIEFS

benzoic acid  
chlorotoluenes  
lauryl pyridinium chloride



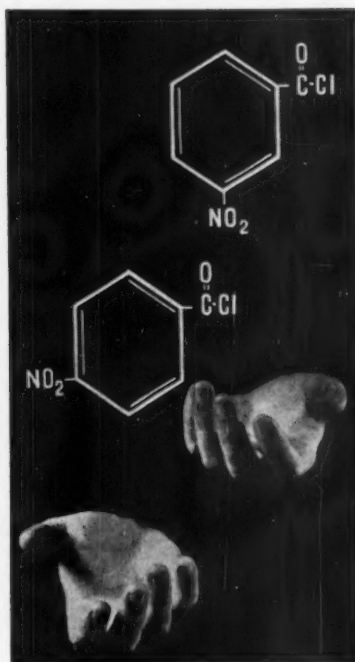
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Only .5% difference in assay distinguishes the technical and USP grades of Hooker benzoic acid. Both are available as a white powder or in crystalline form. The technical grade finds use as a dyeing assistant, especially for materials such as Dacron; as a flattening agent for paints and as a rubber retarder. The USP grade finds use as a preservative in antiseptic preparations and in cosmetics and some other products. Write for our new data sheet.

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For more information, check here and mail with name, title and company address:

- |   |   |
|---|---|
| <input type="checkbox"/> Benzoic acid, Data sheet               | <input type="checkbox"/> <i>meta</i> -nitrobenzoyl chloride, Data sheet |
| <input type="checkbox"/> Lauryl pyridinium chloride, Data sheet | <input type="checkbox"/> <i>para</i> -nitrobenzoyl chloride, Data sheet |

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## ADVERTISING STAFF

Atlanta 3 ..... Michael Miller,  
1301 Rhodes-Haverty Bldg., Jackson  
8-0951

Boston 16 ..... Paul F. McPherson, 850 Park  
Square Building, Hubbard 2-7160

Chicago 11 ..... Alfred D. Becker, Jr.,  
R. J. Clausen, 620 N. Michigan Ave.,  
MOhawk 4-5800

Cleveland 13 ..... H. J. Sweger, Duncan C.  
Stephens, 1164 Illuminating Bldg., 56  
Public Square, Superior 1-7000

Dallas 1 ..... Gordon Jones, John  
Grant, The Vaughan Bldg., 1712 Com-  
merce St., Riverside 7-5117

Denver 2 ..... J. Patten, 1740 Broadway,  
Alpine 5-2981

Detroit 26 ..... H. J. Sweger, Jr., 866  
Pembacot Bldg., Woodward 2-1798

Frankfurt/Main ..... Stanley Kimes,  
85 Westendstrasse, Germany

Geneva ..... Michael R. Zeynel  
2 Place du Port, Geneva, Switz.

Houston 25 ..... Gene Holland, W-724  
Prudential Bldg., Jackson 6-1281

London E.C. 4 ..... E. E. Schirmer, N. Murphy,  
McGraw-Hill House, 95 Farringdon St.,  
England

Los Angeles 17 ..... Robert Yocom, 1125  
West Sixth St., HUntley 2-5450

New York 36 ..... Charles Haines, B. A.  
Johnson, P. E. McPherson, Charles F.  
Onasch, L. Charles Todaro, 500 5th Ave.,  
OXford 5-5959

Philadelphia 3 ..... William B. Hannum, Jr.,  
6 Penn Center Plaza, LOcust 5-4330

Pittsburgh 22 ..... Duncan C. Stephens,  
4 Gateway Center, EXpress 1-1814

San Francisco 4 ..... William C. Woolston,  
63 Post St., DOuglas 2-4600

St. Louis 8 ..... R. J. Clausen, 8615  
Olive St., CONTinental Bldg., JEfferson  
5-4867

\*For complete product data see catalog unit in the BUYERS' GUIDE ISSUE for 1959-60

## ADMINISTRATION

sum Workers Local 293. The contract is retroactive to June 17, calls for an 8¢/hour wage increase and concessions on plantwide seniority. The Union represents 85 employees.

**Corn Contract:** Management of Corn Products Refining Co. and Oil, Chemical & Atomic workers have reached agreement on a two-year contract covering 3,400 employees in four plants, at Argo and Pekin, Ill., North Kansas City, Mo., and Corpus Christi, Tex. The pact calls for a wage increase of 10¢/hour.

## KEY CHANGES

**Robert E. Grant** to president, Textron Pharmaceuticals, Inc., new subsidiary of Textron, Inc. (Providence, R.I.).

**Carl F. Prutton** to board of directors, Commercial Solvents Corp.

**Lacy E. Crain** to chairman of the board, **W. A. Craig, J. R. Damninga, Leb Joyner, C. W. Lyon, Jr., W. J. Roberts, Borden Duffel, R. E. Kennedy, David Yarbrough**, all to board of directors, Pipe Line Chemical Co., Inc. (Dallas, Tex.).

**J. L. Christian** to board of directors and executive committee, **Edward J. Bock, Tom K. Smith, Jr.** to vice-presidents, Monsanto Chemical Co.

**N. Harvey Collisson** to senior vice-president, **Milton L. Herzog** to vice-president, general manager, Metals Div., **Richard M. Furland** to vice-president, general manager, International Div., **Gordon Grand, Jr.** to vice-president, law and administration, **Arthur T. Safford, Jr.** to vice-president, marketing, and **Henry A. Arnold and Donald A. Drummond**, vice-presidents, to senior advisors, Olin Mathieson Chemical Corp. (New York).

**Ross A. Corio** to vice-president, marketing and sales, **Hatco Chemical Div., W. R. Grace & Co.** (New York).

**Laurence A. Tisch** to board of directors, **Eugene Jacobson and Richard Dando** to vice-presidents, Sun Chemical Corp. (New York).

**Thomas R. Young** to vice-president, operations, **The Houston Chemical Corp., subsidiary, Chatham-Reading Chemical Corp.** (New York).

# Tracers

TO THE  
CHEMICAL  
PROCESS  
INDUSTRIES

**Published: each Saturday—closes 11 days in advance.**

**Rate—\$3.00 per line (\$1.50 per line for position wanted ads), minimum 3 lines. Allow 5 average words as line; Count one half line for box number.**

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## POSITIONS VACANT

**Operating Manager Wanted.** Evaporated salt plant in south wants experienced superintendent to manage operation. Work record required to show ability to manage plant and handle people. Opportunity for right person. P-5215, Chemical Week.

**Research Chemists—The following positions are open in expanding Research Division of pharmaceutical company located in Philadelphia.** Salary commensurate with training and experience. **Synthetic Organic Chemist, Ph.D.** with 3-5 years experience in heterocyclics of drug design. **Biochemist, Ph.D.** with several years experience in enzymology. **Analytical Chemist, Ph.D.** or equivalent with experience in microanalytical and spectrophotometric procedures in organic chemistry. Reply giving complete information and salary requirements. P-5182, Chemical Week.

## SELLING OPPORTUNITIES AVAILABLE

**Fatty acid salesman-manager, or broker, or agent** wanted by New East Coast fatty acid producer. Large production available. Replies confidential—Address Box 6657, Baltimore 19, Md.

**Sales Engineer for leading manufacturer of well established, highly successful line of chemical processing equipment to cover prime market area along eastern seaboard.** This offers an exceptional opportunity and bright future for a man who combines chemical processing knowledge and experience with sales engineering ability. Send resume, in strict confidence, to: RW-5235, Chemical Week.

## POSITIONS WANTED

**Advertising—Marketing Manager** seeks more challenging opportunity with chemical or chemical specialty manufacturer. Now handling complete advertising and promotional activities with a nationally-known chemical company. PW-5218, Chemical Week.

**Carbon Black and Graphite Dispersions.** Development. Manufacture. Technical Service, Sales. PW-5234, Chemical Week.

## SELLING OPPORTUNITY WANTED

**Manufacturers Agent for Southwest, experienced** technical sales staff now selling to Chemical, Food, Paper Refineries, Oil and Gas Plants in Texas, La., Okla. and Ark. needs additional lines. Can we represent your product in this area? Engineers & Contractors, P.O. Box 7107, Houston 8, Texas.

**We are interested in commissions for Scandinavia.** All products. Replies to Ru We Plast, Prastgarden 1#, Bro. Sweden.

## PROFESSIONAL SERVICES

**Technical Guidance by Martin H. Gurley, Jr.,** Research Advisory Service, RFD. 4 Lexington, Va. Congress 1-5294.

**The Consulting Engineer.** "By reason of special training, wide experience and tested ability, coupled with professional integrity the consulting engineer brings to his client detached engineering and economic advice that rises above local limitations and encompasses the availability of all modern developments in the fields where he practices as an expert. His services, which do not replace but supplement and broaden those of regularly employed personnel, are justified on the ground that he saves his client more than he costs him."

## CONTRACT WORK WANTED

**Custom Grinding—Ultra Fine or Coarse—Specialty or Volume Blending and Grinding service on unit or contract basis.** Complete CO<sub>2</sub> installation for Nylon, Teflon and Heat Sensitive Materials. A. Cramer Corp., 10881 S. Central Avenue, Box 682, Oak Lawn, Illinois.

## BUSINESS OPPORTUNITY

**Connection with investor wanted by chemist, Ph.D.,** willing to finance exclusively the foundation and operation of a small chemical plant, manufacturing surfactants and related chemical specialties in N.Y. Metropolitan area. BO-5220, Chemical Week.

## EQUIPMENT FOR SALE

**Reaction kettles—Synthetic Resin—Units 1-18,000 lb. charge** stainless with agitator coils condensers, etc. including new "Selsa" gas heating unit. 1-18,000 lb. charge stainless with agitator coils, condensers, etc. heated by a "Trent" electric jacket. 1-10,000 lb. charge stainless with agitator coils, condensers, receiver etc. jacketed for "Arochlor" electric heater. All kettles in equal to new condition and being replaced by larger units by new resin manufacturer. FS-5027, Chemical Week.

**50,000 Tower Packing Rings, ceramic, single spiral** with corrugated outer surface 3/4" O.D., 3" L, 5/16" wall thickness. Price way below cost. Industrial By-Products & Surplus Co., 40-40 Lawrence Street, Flushing 54, New York. Independence 1-4100.

**Shriver 48" cast iron P. & F. filter presses, 50 chambers,** closed delivery, hydraulic closure. Perry Equip't., 1415 N. 6th St., Phila. 22, Pa.

**Sharples C-20 Super-D-Hydrator, type 316 stainless steel.** Perry Equipment Corp., 1415 N. Sixth Street, Philadelphia 22, Pennsylvania.

**Bullvok 42" x 120" double drum dryers ASME 160 #.** WP with conveyors knives vari-drive etc. Perry, 1415 N. 6th St., Phila. Pa.

## CHEMICALS FOR SALE

**60 Lypks. Aluminum Stearate 32¢ lb.** Bulk DOS Plast. 32¢/lb. (dark). Bulk DBS Plast. 33¢/lb. w/w. Bulk Acetone Redistilled 43¢/gal. FS 4980, Chemical Week.

## WANTED/FOR SALE

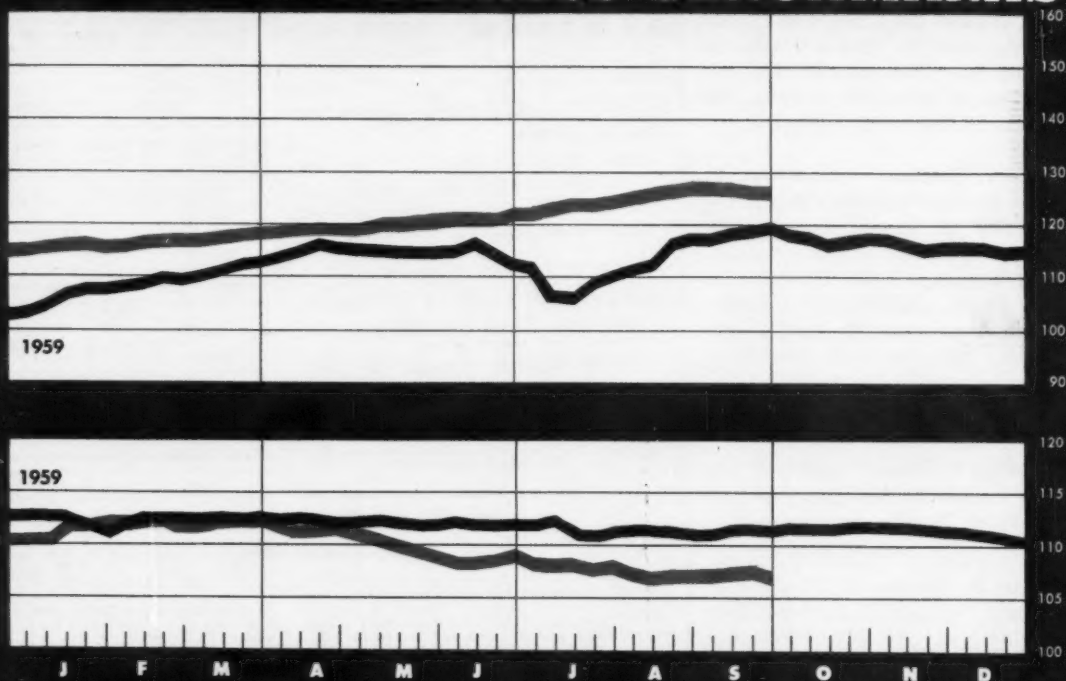
**This Tracer Section can be used whenever you are looking for or offering Equipment, Plants, Supplies, Chemicals, Opportunities, Special Services.** The rates are low—just call or write Classified Advertising Division, Chemical Week, P.O. Box 12, N. Y. 36, N. Y., Longacre 4-3000.

## EQUIPMENT WANTED

**Dryer—Continuous Apron Conveyor type.** Total drying area approx. 250 sq. ft. Apron construction, stainless steel. Hammer Mill—#3 Mikro or equivalent. Mixer—Double arm, blade tilting type. 300 gal. working capacity. Steam jacketed. 40 H.P. Stainless steel construction. Rotary Air Lock—8" x 12". Ball Mill—6" x 10" jacketed. Chrome Manganese Steel. Stainless Reactor—Min. size 6'6" x 8'. Must be built for 100 PSI pressure. 3 Stainless Steel Condensers—200 to 400 sq. ft. of tube surface. Please include price information with full particulars in the first letter. Indicate if you own the equip. and where it is available for inspection. W-5025, Chemical Week.

## MISCELLANEOUS

**To Employers Who Advertise for Men:** The letters you receive in answer to your advertisements are submitted by each of the applicants with the hope of securing the position offered. When there are many applicants it frequently happens that the only letters acknowledged are those of promising candidates. (Others do not receive the slightest indication that their letters have even been received, much less given any consideration.) These men often become discouraged, will not respond to future advertisements and sometimes even question if they are bona fide. We can guarantee that Every Advertisement Printed Is Fully Authorized. Now won't you help keep our readers interested in this advertising by acknowledging every application received, even if you only return the letters of unsuccessful applicants to them marked say, "Position filled, thank you." If you don't care to reveal your identity, mail them in plain envelopes. We suggest this in a spirit of helpful co-operation between employer and the men replying to Positions Vacant advertisements. Classified Advertising Division, McGraw-Hill Publishing Company. "Put Yourself in the Place of the Other Fellow."



SEPTEMBER 10, 1960

## WEEKLY BUSINESS INDICATORS

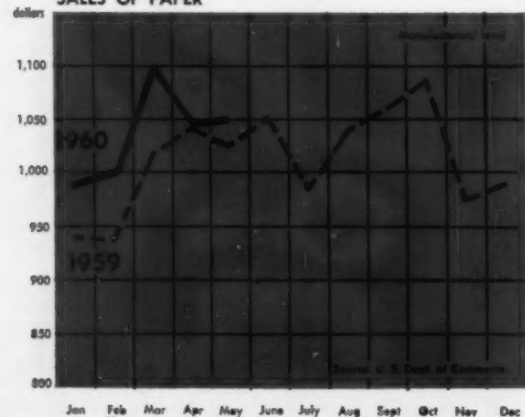
	Latest Week	Preceding Week	Year Ago
Chemical Week output index (1957=100)	124.0	124.0	118.1
Chemical Week wholesale price index (1947=100)	106.5	108.5	110.8
Stock price index (12 firms, Standard & Poor's)	48.39	49.93	59.24
Steel ingot output (thousand tons)	1,533	1,547	332
Electric power (million kilowatt-hours)	14,602	14,453	14,109
Crude oil and condensate (daily av., thousand bbls.)	6,846	6,842	6,765

## EMPLOYMENT INDICATORS (Thousands)

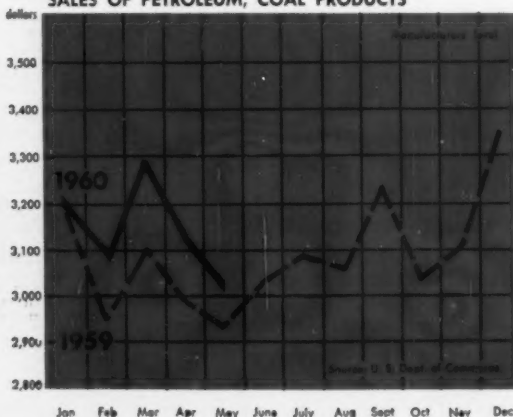
	Latest Month	Preceding Month	Year Ago
All manufacturing	16,378	16,352	16,455
Nondurable goods	6,903	6,835	6,874
Chemicals and allied products	873	879	843
Paper and allied products	568	563	565
Rubber products	259	258	256
Petroleum and coal products	234	232	238

## CHEMICAL CUSTOMERS CLOSE-UP

SALES OF PAPER



SALES OF PETROLEUM, COAL PRODUCTS



# TOTALLY NEW!



New expanded polystyrene case offers advantages never before found in "C.P." Acid containers!

## Lighter! Stronger! Safer! Exclusive new expanded polystyrene case for B&A "C. P." Acids!

**An exclusive development** of General Chemical, this new "one-way" case holds four 5-pint "C.P." acid bottles in contoured pockets formed of shock-resistant low density expanded polystyrene. Here is still another packaging "break-through" from America's leading producer of laboratory and scientific chemicals . . . another example of continuing B&A leadership in reagent packaging.

**Smaller! Lighter!** The new case is substantially smaller than old-fashioned containers and is far easier to store and handle. Tare weight with empty bottles is less than 11 pounds. This saves you money on freight.

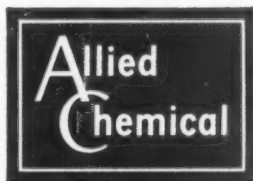
**Easier to handle!** Convenient finger grips make case easy to lift and carry. Top and bottom specially designed with interlocking feature for safe stacking.

**Safer!** The new polystyrene case is chemically resistant, and it is weather-resistant, too. Withstands outdoor storage. Bottles are "cradle cushioned," fully protected in form-fitted polystyrene pockets.

**Stronger!** The new case is far stronger than other "one-way" cases now in use for "C.P." acids. In thorough and extensive testing, it has met the most stringent ICC drop test requirements . . . bottles remained unharmed after 16 separate drops from a 4-foot height!

**Order Now!** These new units are now ready for shipment from General Chemical's B&A distributing points coast to coast. They have had more than a year of intensive research and testing and are *proved* superior to any other type of "shipper" now available! For further information, phone or write your nearest B&A office.

**BAKER & ADAMSON®**  
"C. P." Acids



**GENERAL CHEMICAL DIVISION**  
40 Rector Street, New York 6, N.Y.



Photographed with the cooperation of Bassett Furniture Industries, Inc.

## Wake up to TITANOX® white pigments...

... the titanium pigments so suitable for today's white and light-colored furniture finishes.

Because they meet the twin requirements of end-product quality and production efficiency, TITANOX-RA and TITANOX-RA-50 rutile titanium dioxides are favorites with paint formulators. These easy dispersing pigments provide high brightness, whiteness and hiding power at low pigmentation. Both retard after-yellowing and, in addition, TITANOX-RA-50 retards chalking in finishes that may be exposed to the weather. Above all, the uniformity of these pigments in all properties make them favorites with paint production men.

For primers having higher total pigmentation, the

TITANOX titanium-calcium pigments—TITANOX-RCHT (30%  $\text{TiO}_2$ ) and TITANOX-C-50 (50%  $\text{TiO}_2$ ) provide the necessary hiding power and contribute to the specialized film properties needed for base coats on wood. For outdoor furniture finishes there is, in addition to TITANOX-RA-50, TITANOX-RA-NC, the rutile titanium dioxide with maximum chalking resistance.

There's a TITANOX white pigment not only for white and light-colored furniture finishes, but for products of all types. Titanium Pigment Corporation, 111 Broadway, New York 6, N. Y.; offices and warehouses in principal cities. In Canada: Canadian Titanium Pigments, Ltd., Montreal.

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